ABB solar inverters

Firmware manual
PVS800 central inverters

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List of related manuals

Hardware manuals and guides	Code (English)
PVS800-57 hardware manual	*3AUA0000053689*
Firmware manuals and guides	
PVS800 firmware manual	*3AUA0000058422*
Application guide: Adaptive program for PVS800	*3AUA0000091276*
User's manuals	
PVS-JB-8-M junction box with monitoring for PVS800 central inverters user's manual	*3AUA0000087106*
Option manuals and guides	
Manuals and quick guides for I/O extension modules, fieldbus adapters, etc.	

Firmware manual

PVS800 central inverters

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Start-up

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1

Introduction to the manual

What this chapter contains

This chapter describes the contents of the manual. It also contains information on the applicability of the manual, safety instructions, target audience, related documents and terms and abbreviations.

Applicability

The manual is applicable to PVS800 central inverters with the following control program versions:

- Master control program version GSXR7350 and later (see parameter *04.01 SW PACKAGE VER*)
- Inverter control program version ISXR7350 and later (see parameter *04.01 SW PACKAGE VER*).

Safety instructions

Follow all safety instructions delivered with the inverter.

- Read the complete safety instructions before you install, commission, or use the inverter. The complete safety instructions are given at the beginning of the *Hardware Manual.*
- Read the software function specific warnings and notes before changing the default settings of the function. These warnings and notes are presented together with the parameter descriptions wherever appropriate.
- Read the task specific safety instructions before starting the task. These safety instructions are presented together with the procedure wherever appropriate.

Target audience

This manual is intended for people who commission, adjust the parameters of, or operate, monitor or troubleshoot PVS800 central inverters.

The reader is expected to know the standard electrical wiring practices, electronic components, and electrical schematic symbols.

Contents of the manual

The chapters of this manual are briefly described below.

- *Introduction to the manual* (this chapter).
- *Using the control panel* gives instructions for using the control panel.
- *Start-up* describes the basic start-up procedure of the PVS800.
- *Program features* describes the firmware features of the PVS800.
- *Master control program parameters* describes the parameters of the master control program.
- *Inverter control program parameters* describes the parameters of the inverter control program.
- *Fault tracing* lists all alarm and fault messages with possible causes and corrective actions.
- *Fieldbus control* describes how the PVS800 inverter can be controlled by external devices over a communication network.

Terms and abbreviations

Term	Definition
AC80, AC800M	Types of ABB programmable logic controllers
AGDR	Gate Driver Board. Controls the output semiconductors of the inverter module. There is one AGDR board per phase.
AGPS	Gate Driver Power Supply Board. An optional board within inverter modules used to implement the Prevention of Unexpected Start-up function.
APBU	PPCS Branching and Data Logger Unit. Handles the communication between the inverter control unit and parallel-connected inverter modules.
APOW	Power supply board located in the inverter module
DDCS	Serial communication protocol used in ABB inverters
DriveWindow	PC tool for operating, controlling and monitoring ABB inverters
FCI	Fieldbus communication interface for the ABB S800 I/O system
FPROM	Field programmable read-only memory
INT	Main Circuit Interface Board (located in each inverter module)
INU	Inverter unit
LCL	Passive line filter
MCP	Master control program. See also *RDCU*.
MPPT	Maximum power point tracking
NAMU	Auxiliary measuring unit

Term	Definition
NDBU	DDCS branching unit
NETA	Ethernet adapter module (optional)
PGND board	Grounding monitoring board
RAIO	Analog I/O extension module (optional)
RAM	Random-access memory
RDCO	DDCS Communication Option; a satellite board that can be snapped on the RMIO board to add the number of fiber optic channels available
RDCU	Type of control unit. The PVS800 contains two RDCUs. One of the RDCUs [A41] controls the inverter unit, the other [A43] contains the master control program. The RDCU houses the RMIO board.
RDIO	Digital I/O extension module (optional)
RDNA	DeviceNet adapter module (optional)
RETA	Ethernet and Modbus TCP adapter module (optional)
RMBA	Modbus adapter module (optional)
RMIO	Control and I/O board contained within the RDCU.
RPBA	PROFIBUS adapter module (optional)

2

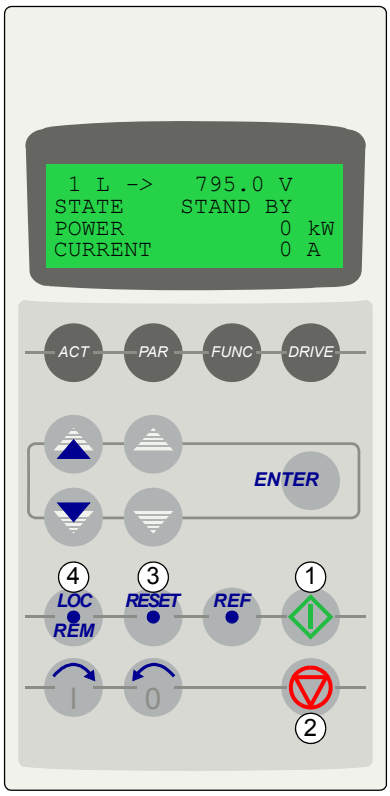
Using the control panel

What this chapter contains

This chapter describes how to use the control panel CDP 312R. The control panel is used to control the PVS800, read status data, and adjust parameters. The PVS800 is programmable through a set of parameters.

The communication between the CDP 312R control panel and the inverter uses the Modbus protocol. The communication speed of the bus is 9600 bit/s. 31 stations (inverters, drives, etc.) and one panel can be connected to the bus. Each station must have a unique ID number.

Overview of the panel



The LCD type display has 4 lines of 20 characters.

The language is selected at start-up. The control panel has four operation modes:

- Actual Signal Display mode (ACT key)
- Parameter mode (PAR key)
- Function mode (FUNC key)
- Control Unit Selection mode (DRIVE key)

The use of single arrow keys, double arrow keys and ENTER depend on the operation mode of the panel.

The control keys are:

No.	Use
1	Start
2	Stop
3	Fault reset
4	Change between Local/Remote (external) control

Identification display

When the control panel is connected to the panel link for the first time, or when the inverter is powered up, the identification display shows the panel software version:

```
CDP312 PANEL  V5.30
```

After the identification display, the panel enters the Control Unit Selection mode and displays the following program information:

```
PVS800 PVA

GSXR7320
ID-NUMBER  1
```

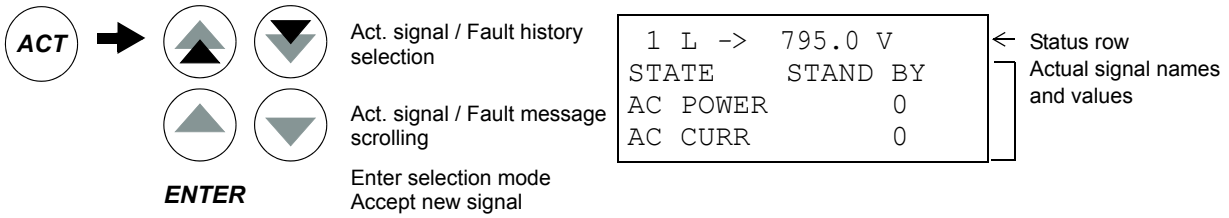
After two seconds, the display will clear, and the Actual Signal Display mode will appear.

Note: The panel can be connected while power is applied to the PVS800.

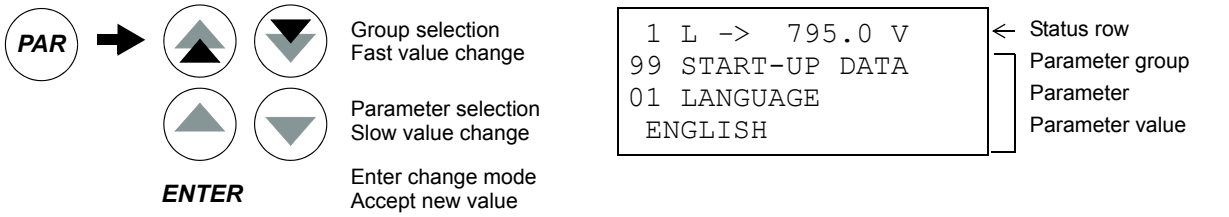
Panel operation mode keys and displays

With control panel keys the user can select status data, parameters and change parameter settings. The figure below shows the mode selection keys of the panel, and the basic operations and displays in each mode.

Actual Signal Display mode

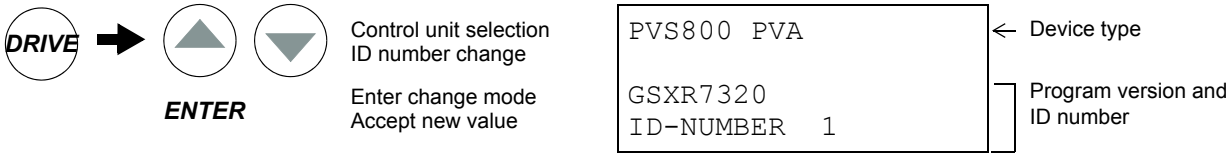


Parameter mode



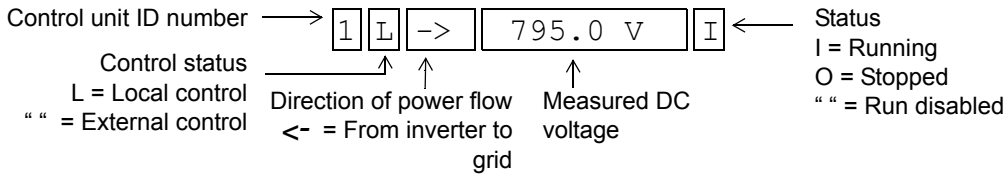
Function mode

Control Unit Selection mode



Status row

The figure below describes the status row digits.



PVS800 control with the panel

The user can control the PVS800 with the panel as follows:

- start and stop the PVS800
- reset any fault and alarm messages
- change between local and external control locations.

The panel can be used for PVS800 control always when the PVS800 is under local control and the status row is visible on the display. L indicates local control on the panel display; external control (through I/O or fieldbus interface) is indicated by a blank space in the same location.

Operational (eg, start/stop) commands cannot be given from the panel when the PVS800 is in remote control. Actual signal monitoring, parameter setting, parameter upload and ID number setting are allowed in remote control.

Control units of the PVS800

The PVS800 central inverter contains two control units: the master control unit (running the master control program) and the inverter control unit (running the inverter control program). The control panel is wired to both control units through a Y-splitter.

The PVS800 can be configured and monitored via the master control program (by default, ID 1); the parameters of the inverter control program should not be adjusted unless absolutely necessary. To access the parameters and alarm/fault information of the inverter control program, see *Control Unit Selection mode* on page *25* for instructions on how to switch the panel between the control units.

How to start and stop the PVS800

Step	Action	Press Key	Display
1.	To show the status row.		1 -> 795.0 V STATE STAND BY AC POWER 0 AC CURR 0
2.	To switch to local control. (Only if the PVS800 is not in local control already, ie, if there is no L on the first row of the display.) **Note:** Switching to local control can be prevented by parameter *16.04 LOCAL LOCK*.See page *63*.		1 L -> 795.0 V STATE STAND BY AC POWER 0 AC CURR 0
3.	To stop.		1 L -> 795.0 V STATE STAND BY AC POWER 0 AC CURR 0
4.	To start.		1 L <- 795.0 V I STATE SLEEP AC POWER 0 AC CURR 0

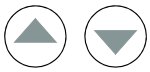
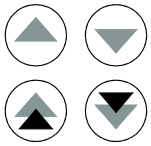
Actual Signal Display mode

The Actual Signal Display mode includes two displays: the Actual Signal Display and the Fault History Display. In this mode, the user can:

- view three actual signals on the display at a time
- select the actual signals to be displayed
- view the fault history
- reset the fault history.

The panel enters the Actual Signal Display mode when the user presses the ***ACT*** key, or if no key is pressed within one minute. If a fault is active, the Fault History Display will be shown before the panel enters the Actual Signal Display mode. If the Control Unit Selection mode is active, the Status Display of the Control Unit Selection mode is shown.

How to select the actual signals for display

Step	Action	Press key	Display
1.	To enter the Actual Signal Display mode.		1 L -> 795.0 V STATE STAND BY AC POWER 0 AC CURR 0
2.	To select a row (a blinking cursor indicates the selected row).		1 L -> 795.0 V STATE STAND BY AC POWER 0 AC CURR 0
3.	To enter the actual signal selection function.	***ENTER***	1 L -> 795.0 V 1 ACTUAL SIGNALS 10 AC POWER [kW] 0
4.	To select an actual signal. To change the actual signal group.		1 L -> 795.0 V 1 ACTUAL SIGNALS 14 REACTIVE POWER 0
5.	To accept the selection and to return to the Actual Signal Display mode.	***ENTER***	1 L -> 795.0 V STATE STAND BY REACTIVE 0 AC CURRE 0
6.	To cancel the selection and keep the original selection, press any of the mode selection keys. The selected keypad mode is entered.		1 L -> 795.0 V STATE STAND BY AC POWER 0 AC CURR 0

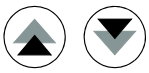
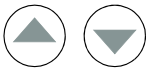
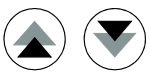
How to display the full name of the actual signals

Step	Action	Press key	Display
1.	To display the full name of the three actual signals.	**Hold** 	1 L -> 795.0 V PVA STATES AC POWER [kW] AC CURRENT L1
2.	To return to the Actual Signal Display mode.	**Release** 	1 L -> 795.0 V STATE STAND BY AC POWER 0 AC CURR 0

How to view and reset the fault history

Note: The fault history cannot be reset if there are active faults or alarms.

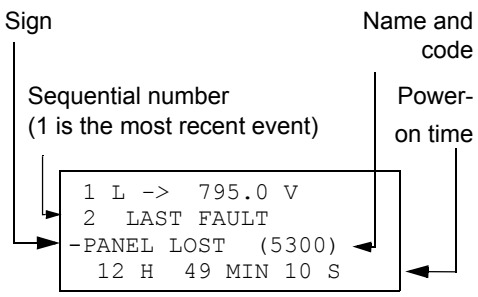
Note: When viewing the fault history of the master control program, fault and alarm messages originating in the inverter control program are preceded by a “>” sign. More information on the fault/alarm is stored in the fault history of the inverter control program. Follow the procedure *How to select a control unit and change its panel link ID number* (page *25*) to switch to the inverter control program and view its fault history. See also section *Fault history* on page *36*.

Step	Action	Press key	Display
1.	To enter the Actual Signal Display mode.		1 L -> 795.0 V STATE STAND BY AC POWER 0 AC CURR 0
2.	To enter the Fault History Display. The time of occurrence can be seen either as total power-on time or in the date format if an external control system has been connected to control the PVS800.		1 L -> 795.0 V 2 LAST FAULT -PANEL LOST (5300) 20 H 49 MIN 56 S
3.	To select the previous (UP) or the next fault/ alarm (DOWN). To clear the Fault History.	 	1 L -> 795.0 V 2 LAST FAULT H MIN S 1 L -> 795.0 V 2 LAST FAULT +SYSTEM START (1087) 12 H 49 MIN 10 S
4.	To return to the Actual Signal Display mode.		1 L -> 795.0 V STATE STAND BY AC POWER 0 AC CURR 0

About the fault history

The fault history restores information on the 16 latest events (faults, alarms and resets) of the control program. The table below shows how the events are stored in the fault history.

A Fault History View



Event	Information on display
PVS800 detects a fault and generates a fault message.	Sequential number of the event and LAST FAULT text Name of the fault and a “+” sign in front of the name Total power-on time
User resets the fault message.	Sequential number of the event and LAST FAULT text RESET FAULT text Total power-on time
PVS800 generates an alarm message.	Sequential number of the event and LAST WARNING text Name of the alarm and a “+” sign in front of the name Total power-on time
PVS800 deactivates the alarm message.	Sequential number of the event and LAST WARNING text Name of the alarm and a “-” sign in front of the name Total power-on time

How to display and reset an active fault

Step	Action	Press Key	Display
1.	To display an active fault.	ACT	1 L -> 795.0 V PVS800 PVA *** FAULT *** PANEL LOSS (5300)
2.	To reset the fault.	RESET	1 L -> 795.0 V STATE STAND BY AC POWER 0 AC CURRE 0

Parameter mode

In the Parameter mode, the user can:

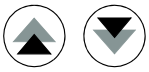
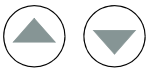
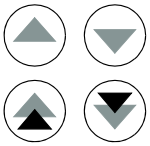
- view parameter values
- change parameter settings.

The panel enters the Parameter mode when the user presses the ***PAR*** key.

Note: Certain parameters do not allow changes. If tried, no change is accepted, and the following warning is displayed:

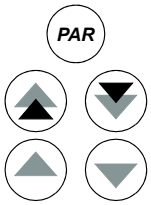
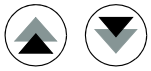
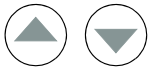
```
**WARNING**
WRITE ACCESS DENIED
PARAMETER SETTING
NOT POSSIBLE
```

How to select a parameter and change the value

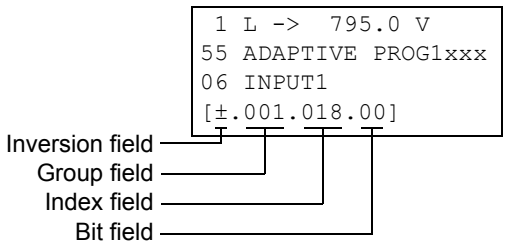
Step	Action	Press key	Display
1.	To enter the Parameter mode.		1 L -> 795.0 V 10 CMD GROUP 01 RESET CMD NOT SET
2.	To select a group. When the arrow button is pressed down, only the parameter group name is displayed. When the button is released also the first parameter of the group is displayed.		1 L -> 795.0 V 13 ANALOGUE INPUTS 01 AI1 CONV MODE NORMAL
3.	To select a parameter within a group. When the arrow button is pressed down, only the parameter name is displayed. When the button is released also the parameter value is displayed.		1 L -> 795.0 V 13 ANALOGUE INPUTS 15 EXT1 AI1 HW MODE UNIPOLAR
4.	To enter the parameter setting function.	***ENTER***	1 L -> 795.0 V 13 ANALOGUE INPUTS 15 EXT1 AI1 HW MODE [UNIPOLAR]
5.	To change the parameter value. (slow change for numbers and text) (fast change for numbers only)		1 L -> 795.0 V 13 ANALOGUE INPUTS 15 EXT1 AI1 HW MODE [BIPOLAR]
6a.	To save the new value.	***ENTER***	1 L -> 795.0 V 13 ANALOGUE INPUTS 15 EXT1 AI1 HW MODE BIPOLAR
6b.	To cancel the new setting and keep the original value, press any of the mode selection keys. The selected mode is entered.		1 L -> 795.0 V 13 ANALOGUE INPUTS 15 EXT1 AI1 HW MODE UNIPOLAR

How to adjust a source selection parameter

Most parameters define values that are used directly in the control program. Source selection parameters are exceptions as they point to the value of another parameter. The parameter setting procedure differs somewhat from that of the other parameters.

Step	Action	Press Key	Display
1.	See the table above to - enter the Parameter mode - select the correct parameter group and parameter - enter the parameter setting mode.	 ***ENTER***	1 L -> 795.0 V 55 ADAPTIVE PROG1 06 INPUT1 +.000.000.00
2.	To scroll between the inversion, group, index and bit fields.[1)]		1 L -> 795.0 V 55 ADAPTIVE PROG1 06 INPUT1 [±.000.000.00]
3.	To adjust the value of a field.		1 L -> 795.0 V 55 ADAPTIVE PROG1 06 INPUT1 [±.000.018.00]
4.	To accept the value.	***ENTER***	1 L -> 795.0 V 55 ADAPTIVE PROG1 06 INPUT1 +.000.018.00

1)



Inversion field inverts the selected parameter value. Plus sign (+): no inversion, minus (-) sign: inversion.

Bit field selects the bit number (relevant only if the parameter value is a packed Boolean word).

Index field selects the parameter index.

Group field selects the parameter group.

Note: Instead of pointing to another parameter, it is also possible to define a constant by the source selection parameter. Proceed as follows:

- Change the inversion field to C. The appearance of the row changes. The rest of the line is now a constant setting field.
- Give the constant value to the constant setting field.
- Press ***ENTER*** to accept.

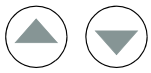
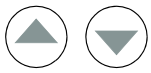
Function mode

In the Function mode, the user can adjust the contrast of the display.

The panel enters the Function mode when the user presses the ***FUNC*** key.

Note: The upload and download functions visible in the Function mode are not supported by the PVS800.

How to set the contrast of the display

Step	Action	Press Key	Display
1.	To enter the Function mode.		1 L -> 795.0 V UPLOAD <= <= DOWNLOAD => => CONTRAST 4
2.	To enter the page that contains the upload, download and contrast functions.		1 L -> 795.0 V UPLOAD <= <= DOWNLOAD => => CONTRAST 4
3.	To select a function (a flashing cursor indicates the selected function).		1 L -> 795.0 V UPLOAD <= <= DOWNLOAD => => CONTRAST 4
4.	To enter the contrast setting function.	***ENTER***	1 L -> 795.0 V CONTRAST [4]
5.	To adjust the contrast.		1 L -> 795.0 V CONTRAST [7]
6.a	To accept the selected value.	***ENTER***	1 L -> 795.0 V UPLOAD <= <= DOWNLOAD => => CONTRAST 7
6.b	To cancel the new setting and retain the original value by pressing any of the mode selection keys. The selected mode is entered.		1 L -> 795.0 V MSW 0 AC POWER 0 AC CURRE 0

Control Unit Selection mode

The Control Unit Selection mode is used to switch the control panel between the master control unit and the inverter control unit.

In the Control Unit Selection mode, the user can:

- Select the control unit (master or inverter) with which the control panel communicates.
- Change the identification number of a control unit.
- View the status of the control units connected to the panel.

The panel enters the Control Unit Selection mode when the user presses the ***DRIVE*** key.

Each on-line control unit must have an individual identification number (ID). By default,

- the ID number of the master control unit (master control program) is 1
- the ID number of the inverter control unit (inverter control program) is 2.

Note: The default ID number settings of the two control units of the PVS800 should not be changed unless the PVS800 is to be connected to a panel link (constructed by using optional NBCI-xx modules) with other PVS800 inverters on-line.

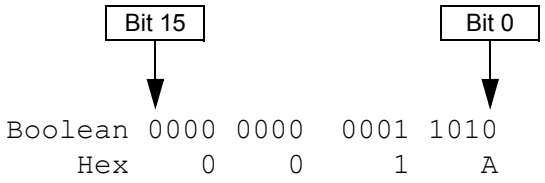
How to select a control unit and change its panel link ID number

Step	Action	Press key	Display
1.	To enter the Control Unit Selection mode.	DRIVE	PVS800 PVA GSXR7300 ID-NUMBER 1
2.	To select the next control unit/view. The ID number of the current control unit is changed by first pressing ***ENTER*** (the brackets round the ID number appear) and then adjusting the value with arrow buttons. The new value is accepted with ***ENTER***. The power to the control unit must be switched off to validate its new ID number setting. The status display of all devices connected to the Panel Link is shown after the last individual station. If all stations do not fit on the display at once, press the double-arrow up to view the rest of them.	▲	PVS800 xxxx_5PV ISXR7300 ID-NUMBER 2 1⃗ Status Display Symbols: ⃗ = Stopped F = Tripped on a fault
3.	To connect to the last displayed control unit and to enter another mode, press one of the mode selection keys. The selected mode is entered.	ACT PAR FUNC	

Reading and entering packed Boolean values on the display

Some actual values and parameters are packed Boolean, ie, each individual bit has a defined meaning (explained at the corresponding signal or parameter). On the control panel, packed Boolean values are read and entered in hexadecimal format.

In this example, bits 1, 3 and 4 of the packed Boolean value are ON:



3

Start-up

Note: Use local control when commissioning the PVS800.

Note: Make sure the ID number of the control unit you are working on is 1 (the master control program). The parameters of the inverter control program do not normally need to be changed.

To start up the PVS800, do as follows:

- Check that the mechanical and electrical installation and other preparations have been made according to the instructions given in the *Hardware manual.*
- Check the following master control program parameters:
  - *31.04 UDC START LIM*. This value must be lower than the open-circuit voltage of the solar generator.
  - *31.05 UDC START DLY*. The correct setting will minimize the number of unnecessary starts during low light conditions.
  - *31.06 UDC STOP LIM*. This value must be lower than the normal output voltage of the solar generator.
  - *31.07 UDC STOP DLY*
  - *31.10 POWER STOP LIM*
  - *31.11 POWER STOP DLY*
  - *31.12 GOTO SLEEP MODE*.

    The correct settings of the above parameters will minimize the number of unnecessary starts during low light conditions.
  - *31.16 POWER LIMITING*. The output power of the PVS800 can be limited to a below nominal value, eg, to protect the AC network.
- Configure any remote control parameters if used (I/O control or fieldbus adapter).
- Configure remote monitoring according to the ABB Remote monitoring portal user's manual (3AUA0000098904 [English]).

- Follow the operation of the PVS800 and fine-tune the voltage levels and delays for optimum performance.
- Configure the automatic start functionality if needed. The automatic start function might be useful, for example, after an AC network failure.

4

Program features

What this chapter contains

This chapter describes program features. For each feature, there is a list of related parameters, faults and alarms if applicable.

Control interfaces

Local vs. External control

The PVS800 can be controlled/monitored:

- locally from control panel
- locally from DriveWindow PC tool (connect the fibre optic cables to DDCS channel CH3 on the RDCO DDCS Communication Option module)
- externally via I/O and/or the fieldbus interface.

With control panel or DriveWindow PC tool, the user can change parameters, view/reset the fault history, and stop the inverter.

Control panel

Both control units of the PVS800 can be monitored and controlled locally from a single CDP 312R control panel. Most of the essential functions (start, stop, fault reset, etc.) of the PVS800 are available through the master control program. In case the parameters, fault history, etc. of the inverter unit must be accessed, select control unit ID 2 in Control Unit Selection mode (see page *25*).

DriveWindow

DriveWindow and other tools can be connected to DDCS channel CH3 on the master control unit (RDCU, designation A43), either in a ring, or a star configuration using NDBU

branching units. With multiple inverters, different node numbers must be set for each inverter before starting the communication (see parameter *70.15 CH3 NODE ADDR*, page *89*). This setting can be made by a point to point connection with control panel CDP 312R or DriveWindow. The new node address becomes valid on the next power-up of the control unit. DDCS channel CH3 is a slave in the communication link.

Fieldbus

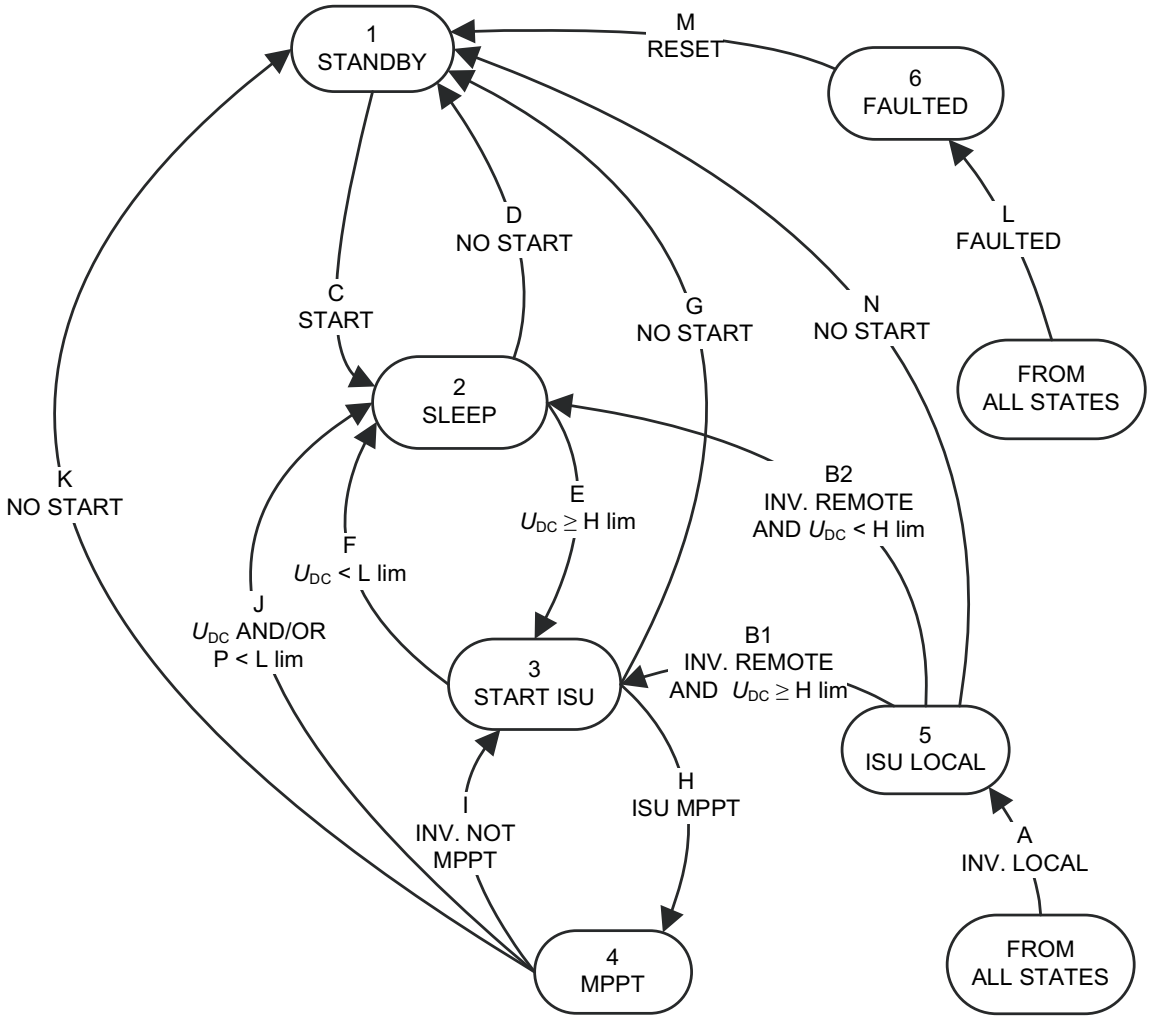
For information on how to control/monitor the PVS800 through an external control system, see chapter *Fieldbus control* (page *169*).

I/O

The PVS800 can be controlled and monitored with digital and analog signals connected to the master control unit. See *Hardware manual* for the available connections. See also section *Automatic fault reset* (page *35*).

PVS800 state machine

The PVS800 follows the state machine shown below.



The following table describes the PVS800 state machine states. The required signals are shown in the table describing the conditions of state transitions.

STANDBY	The inverter is powered and it is waiting for a start command. The power-up initialization routine has been performed and the inverter unit is ready. There are no active faults. The DC and AC contactors are open.
SLEEP	The start command is active but the inverter is waiting for all start conditions to be filled. The start conditions includes a sufficient DC voltage level and corresponding time delay as well as wake up signals.
START ISU	The start command is active and all start conditions have been met. The start command is sent to the inverter unit and the cut-in procedure is activated. The inverter will synchronize and connect to the grid if all required conditions are fulfilled. After the grid connection the DC voltage from a solar array is connected.
MPPT	The maximum power point tracker (MPPT) state is the normal operation state of the PVS800 when the inverter is feeding power to the grid. The inverter is producing maximal power under available conditions.
ISU LOCAL	The inverter control unit has been switched to the local control mode. This mode can be used, eg, for testing and commissioning purposes even without the DC power. For more information about the ISU local mode, see section *Fault history*.
FAULTED	The PVS800 is set to the faulted state when a fault occurs in the master control program or in the inverter control program. The inverter is stopped and AC and DC contactors are opened.

The conditions for state transitions are as follows:

A	*08.05 PVA STATUS WORD* bit 1 = 1
B1	*08.05 PVA STATUS WORD* bit 1 = 0 **AND** $U_{DC} \geq$ *31.04 UDC START LIM* **AND** start command on
B2	*08.05 PVA STATUS WORD* bit 1 = 0 **AND** $U_{DC} <$ *31.04 UDC START LIM* **AND** start command on
C	Start command on **AND** *08.05 PVA STATUS WORD* bit 3 = 1 **AND** *31.01 ENABLE MPPT* = 1
D	Start command removed **OR** *08.05 PVA STATUS WORD* bit 3 = 0 **OR** *31.01 ENABLE MPPT* = 0
E	$U_{DC} \geq$ *31.04 UDC START LIM* **AND** *31.05 UDC START DLY* has elapsed **AND** *31.13 WAKE UP SOURCE* > *31.14 WAKE UP START LIM* **AND** *31.15 WAKE UP START DLY* has elapsed
F	$U_{DC} <$ *31.06 UDC STOP LIM* **AND** *31.07 UDC STOP DLY* has elapsed
G	Start command removed **OR** *08.05 PVA STATUS WORD* bit 3 = 0 **OR** *31.01 ENABLE MPPT* = 0
H	*08.05 PVA STATUS WORD* bit 0 = 1
I	*08.05 PVA STATUS WORD* bit 0 = 0
J	($U_{DC} <$ *31.06 UDC STOP LIM* **AND** *31.07 UDC STOP DLY* has elapsed) **OR** (*31.09 POWER SOURCE* < *31.10 POWER STOP LIM* **AND** *31.11 POWER STOP DLY* has elapsed)
K	Start command removed **OR** *31.01 ENABLE MPPT* = 0 **OR** *08.05 PVA STATUS WORD* bit 3 = 0
L	A fault has occurred
M	Reset command has been given
N	(*08.05 PVA STATUS WORD* bit 1 = 0 **AND** start command removed) **OR** *31.01 ENABLE MPPT* = 0

The parameters above are described in chapter *Master control program parameters*.

Maximum power point tracking (MPPT)

The maximum power point of a solar panel refers to the point on the output current/voltage curve where the product of current and voltage is at maximum. The current and voltage are dependent on solar radiation and panel temperature, so the maximum power point may move on the curve. There may even be multiple maximum points.

The internal Maximum power point tracking (MPPT) function of the PVS800 automatically operates the solar panels at their maximum power point under all conditions.

External MPPT reference

In normal use, the internal MPPT algorithm provides the PVS800 with a DC reference. An external DC reference can alternatively be used if necessary.

Settings

Inverter control program: Parameter group *39 MPPT CONTROL* (page *126*).

Diagnostics

Parameters *08.04 PVA STATES* (page *52*) and *08.05 PVA STATUS WORD* (page *52*).

Sleep mode

The PVS800 can be set to automatically go into sleep mode as the DC output voltage of the solar panels and/or output power of the inverter falls below a specified limit at night. The inverter unit will stop modulating, but the PVS800 will still monitor the output of the panels, and automatically start when the DC voltage rises above a pre-defined level.

See also section *PVS800 state machine* (page *30*).

Settings

Parameter group *31 PVA CONTROL* (page *67*).

Diagnostics

Parameter *08.04 PVA STATES* (page *52*).

Operation voltages

The normal operation range of the maximum power point tracking (MPPT) depends on the inverter nominal power according to the table below.

Inverter power	MPP range
100 kW, 250 kW, 500 kW	450…825 V
315 kW, 630 kW	525…825 V

Starting the inverter unit without solar generator power

The inverter unit of the PVS800 can be started in local control with the solar generator disconnected (ie, with the DC contactor open) as long as the inverter is connected to the grid. This special mode can be useful for testing during commissioning or troubleshooting. In this mode the inverter will not produce active power.

In the ISU local mode the inverter can be run without solar modules connected to the inverter, for example to test the start-up procedure in an existing AC grid. The DC contactor is not closed in the ISU LOCAL mode.

Settings

- To switch control to the inverter control program, see instructions in *Control Unit Selection mode* on page *25*.
- To switch to the local control mode and start the inverter, see instructions in *How to start and stop the PVS800* on page *18*.

Grid identification

At first start, the inverter unit adapts itself to the grid automatically. No grid data needs to be set by the user.

During identification, the grid voltage, frequency and phase order are recognized. This takes approximately four seconds.

Automatic grid identification is active by default and is repeated every time the inverter unit receives a start command after a power-up. Automatic grid identification can be deactivated with parameter *99.08 AUTO LINE ID RUN* (page *148*) if the grid identification has been successfully completed during commissioning. Manual grid identification can also be chosen.

Settings

- Inverter control program: Parameter *99.07 LINE SIDE ID RUN* (page *148*)
- Inverter control program: Parameter *99.08 AUTO LINE ID RUN* (page *148*).

Diagnostics

- Parameter *09.11 SUPPLY FAULT WORD*, bit 9 (page *54*)
- Fault *>NET VOLT (3285)* (page *154*).

DC overvoltage monitoring

The PVS800 will not start if the measured DC voltage exceeds an internal start limit (1000 V by default). The voltage must remain below the limit for 60 seconds before the inverter will start.

If the DC voltage exceeds an internal limit (900 V by default) while the inverter is running in the MPPT mode, the inverter will go to the sleep mode. This may be caused by active power limitation or incorrect solar array sizing.

Diagnostics

- Parameter *09.15 PVA ALARM WORD*, bit 6 (page *55*)
- Alarm *UDC HIGH LIM (32A7)* (page *156*).

Automatic start after a power-up

The PVS800 can be set to start automatically after the auxiliary power to the control units has been switched on. This enables the PVS800 to start after a power failure without the need of an operator locally pressing the Start button.

To use this functionality, I/O control must be enabled (*10.02 ENABLE I/O CTRL*, page *57*). If a constant start command is selected by parameter *10.04 I/O START SOURCE* (page *57*), the PVS800 will start automatically after the auxiliary power has switched on. The default input for the start/stop signal is digital input DI2 on the master control unit [A43]. Constant value 1 can be selected by setting parameter *10.04 I/O START SOURCE* to C.00001 (there is no need to connect a wire to DI2).

If the PVS800 is equipped with an emergency stop circuit (option +Q951), it must be acknowledged before the start command is accepted. This can be done with a relay output on the master control unit (see parameter *10.03 EM STOP AUTORESET*, page *57*) and the *Hardware manual.*

WARNING! If I/O control is enabled and a start command is active, the PVS800 will start after the auxiliary power to the control units has switched on.

Settings

Parameters *10.02*…*10.05* (page *57*).

Diagnostics

Alarm *IO START ENA (61AA)* (page *154*).

Reactive power control

The PVS800 is capable of generating a selectable amount of reactive power to the grid (positive = capacitive, negative = inductive). A reference value for the reactive power can be given via the CDP312R control panel, PC tools, fieldbuses or PLC. Other inputs (like analog and digital inputs) can be used with an adaptive program.

A reference type for the reactive power can be selected from seven different formats, see parameter *24.03 Q POWER REF SEL* (page *66*). A reference value must be finally written to a parameter *24.02 Q POWER REF* (page *65*) according to the selected reference format.

Note: The PVS800 can generate reactive power according to the given reference if the nominal current of the inverter is not exceeded. If the PVS800 is already feeding nominal current to the grid, parameter *42.12 POWER PRIORITY* defines if activer or reactive power is limited. In this case the actual reactive power and the reactive power reference may not be the same.

Settings

Parameter group *24 REACTIVE POWER* (page *65*) and parameter *42.12 POWER PRIORITY* (page *133*).

Diagnostics

Parameter *01.14 REACTIVE POWER* (page *45*).

Active power limitation

The active output power of the PVS800 can be limited using an external source (for example, through the grid operator). The power limitation signal can be directly sent to the PVS800 via the CDP312R control panel, PC tools, fieldbuses (by default, data word 1 in data set 12) or PLC. Other inputs (like analog and digital inputs) can be used with an adaptive program.

A limitation signal for the active power must be written to a parameter *31.16 POWER LIMITING* (page *69*). There is an internal ramping for the active power limitation (by default, a 10 second ramp if there is a stepwise change of 100% in the limitation signal).

An active power limitation is indicated by *08.08 LIMIT WORD* (page *53*). The active power can also be limited by the inverter itself. This is possible, for example, if the ambient temperature exceeds limits or if the reactive power has been prioritized and the inverter current limit is reached.

Settings

Parameters *42.12 POWER PRIORITY* (page *133*), *31.16 POWER LIMITING* (page *69*) and *90.04 D SET 12 VAL 1* (page *90*).

Diagnostics

Signal *08.08 LIMIT WORD* (page *53*).

Automatic fault reset

The PVS800 can be configured to reset its faults automatically. All faults excluding the inverter unit short circuit fault can be reset with the automatic reset function. The number of reset tries, as well as the interval between the individual resets, can be set by master control program parameters *30.04 RESET DELAY [s]* (page *66*) and *30.05 NUMBER OF TRIALS* (page *66*).

There is also an option to switch off the automatic reset function for certain faults. These faults are defined with parameter *30.11 AUTO RESET MASK* (page *67*).

WARNING! If the PVS800 was running before it was stopped by a fault, it will restart after a successful automatic reset and wake-up delay (if set).

Settings

Parameters *30.04 RESET DELAY [s]* (page *66*), *30.05 NUMBER OF TRIALS* (page *66*) and *30.11 AUTO RESET MASK* (page *67*).

Diagnostics

- Parameters *09.14 PVA FAULT WORD*, bit 8 (page *55*) and *09.15 PVA ALARM WORD*, bit 3 (page *55*)
- Alarm *AUTORESET A (6081)* (page *151*)
- Fault *AUTORESET F (6080)* (page *151*).

Fault history

Each control program of the PVS800 has its own fault history. The fault logger of the master control program creates a history of all internal events of the master control program. To access the fault history, follow the directions under *How to view and reset the fault history* (page *20*).

Selected fault and warning events originating in the inverter unit are compiled into master control program parameters *09.11 SUPPLY FAULT WORD* (page *54*), *09.12 SUPPLY ALARM WORD* (page *54*), *09.14 PVA FAULT WORD* (page *55*) and *09.15 PVA ALARM WORD* (page *55*). These events are distinguished by a preceding “>” sign in the log and on the control panel display.

If a general warning *ISU WARNING (8186)* (page *154*) or general fault *ISU FAULT (8185)* (page *154*) is present in the fault history of the master control program, the fault history of the inverter control program should be checked to find out the exact cause. This can be done using the control panel by selecting control unit ID 2 in Control Unit Selection mode (see page *25*), and by viewing the fault history as described under *How to view and reset the fault history* (page *20*).

For more information about fault logging and tracing, see chapter *Fault tracing* (page *149*).

Diagnostics

- Parameters *09.11 SUPPLY FAULT WORD* (page *54*) and *09.12 SUPPLY ALARM WORD* (page *54*).
- Inverter control program: Parameter group *09 FAULT WORDS* (page *105*).

Anti-islanding

Anti-islanding is used to prevent an island situation in an electrical network. An island in electrical network is a situation in which a generator is powering a part of the network even though power from the electrical utility network has been cut off. Islanding can be dangerous to people working with the network and not realizing that the circuit is still powered. For that reason distributed power generators must detect islanding and immediately stop producing power to the network.

The PVS800 supports anti-islanding in two different modes. Passive anti-islanding attempts to detect transient changes on the network frequency and use that information to decide whether the network is present. The island situation is theoretically possible if the load within the network matches the feeding power when there is a network failure. The above-mentioned situation cannot be detected only with the passive anti-island monitoring. In addition to passive anti-islanding, the reactive power variation (RPV) can be used to verify the existence of the electrical network. In the RPV mode a small pulse type signal is injected to the network and the passive method is used to monitor rate changes in the network frequency.

Settings

Inverter control program: Parameters in group *45 ANTI-ISLANDING* (page *136*).

Low voltage ride-through (LVRT)

The user can define when the drive must stay connected to the grid (ie, the depth and length of the grid voltage transient). The user can also define how much the drive supports the grid by feeding capacitive reactive current to the grid when the grid voltage stays below a defined area.

By default, the PVS800 always tries to feed 100% nominal current during LVRT. Nominal current is 100% active current if the grid support is not active. If the grid support is active, the following formula is valid and active current is fed based on the formula below:

$$I_P = \sqrt{I^2_{NOM} - I^2_Q}$$

where I_P is active current, I_{NOM} is nominal current and I_Q is reactive current.

If active current during a voltage dip is not allowed, contact ABB.

Settings

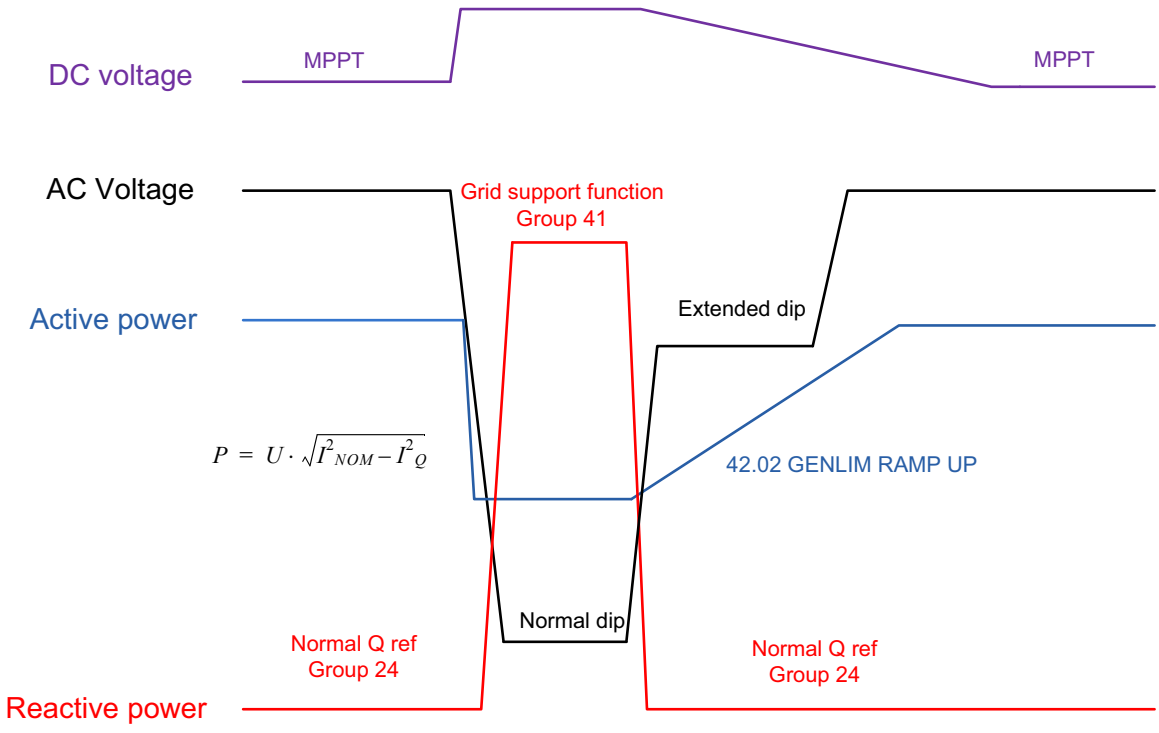
Parameters are visible but password-protected. The PVS800 must to be stopped before parameters can be changed.

- Parameters for LVRT: *40.01* (page *127*), *40.05*…*40.24* (pages *128*…*130*) and *42.02* (page *132*).
- Parameters for grid support: *41.01*…*41.12* (pages *130*…*132*)

Diagnostics

- Parameter *08.01 MAIN STATUS WORD* (page *102*)
- Alarm *LVRT RIDETRGH (32A0)* (page *163*)
- Faults *HIGH UAC PEAK (32A4)* (page *162*), *HIGH UAC LEV (32A5)* (page *162*), *RT NET LOST (32A1)* (page *166*)

See the diagram below.



Grid support

Grid support means that capacitive reactive power is fed to the grid during a voltage dip. Grid support settings can be set in parameter group *41 GRID SUPPORT* (page *130*).

The reactive current reference is defined as a function of the grid voltage. Four different voltage levels can be defined. When grid voltage is between the defined levels, linear extrapolation is used to calculate the exact reactive current reference. The grid support function is activated and the operation mode selected by parameter *41.01 GRID SUPPORT MODE* (page *130*). The amount of grid support is defined by parameters *41.03*…*41.10* (page *131*…*132*). A fixed amount of reactive current can be given with parameter *41.11 RT IQREF* (page *132*). If the value of parameter *41.11 RT IQREF* is non-zero, then parameters *41.03*…*41.10* are bypassed. The reactive current ramp-up time at the beginning of LVRT can be changed with parameter *41.12 RT IQ RAMP UP* (page *132*).

Grid support is not active in the extended dip range defined in group *40 LVRT CONTROL*.

Settings

Parameters are visible but password-protected. The PVS800 has to be stopped before parameters can be changed. LVRT must be active. Parameter *40.01 LVRT MODE* (page *127*) must be checked.

For further information on grid support, see parameters *41.01*…*41.12*.

Grid monitoring for voltage and frequency

The PVS800 can monitor grid conditions (voltage and frequency) with internal measurements or with an external grid monitoring device (usually a grid monitoring relay). Depending on the installation country, an external third party -certified relay may be needed.

Grid monitoring relay (+Q969/+Q974)

An output of the grid monitoring relay (option +Q969/+Q974) is signal that informs whether the grid is OK. The grid monitoring signal is connected to the RDIO-01 module installed on RDCU A41. See the hardware manual for connection details. A usage mode of the external grid monitoring can be selected from parameter *39.06 GRIDMON SUPV MODE* (page *127*).

Internal grid monitoring

The internal grid monitoring is based on three-phase voltage measurements via a NAMU measurement board. A positive sequence of the grid voltage (*01.11 MAINS VOLTAGE*, page *97*) and a grid frequency (*02.18 GRID FREQUENCY*, page *99*) are calculated from measurements. These values are compared against protection limits to see if the grid is OK. The internal grid monitoring has three operation modes: alarm (the inverter continues to run with a grid monitoring alarm), fault (the inverter stops with a grid monitoring fault) and none (the internal grid monitoring is disabled).

The internal grid monitoring has two adjustable settings for under voltage, over voltage, under frequency and over frequency. Each of these settings has its own adjustable time delay (ie, how long time the grid must be in an abnormal condition before the inverter reacts). Settings for the internal grid monitoring can be found from parameter group *44 GRID MONITORING* (page *134*).

Settings

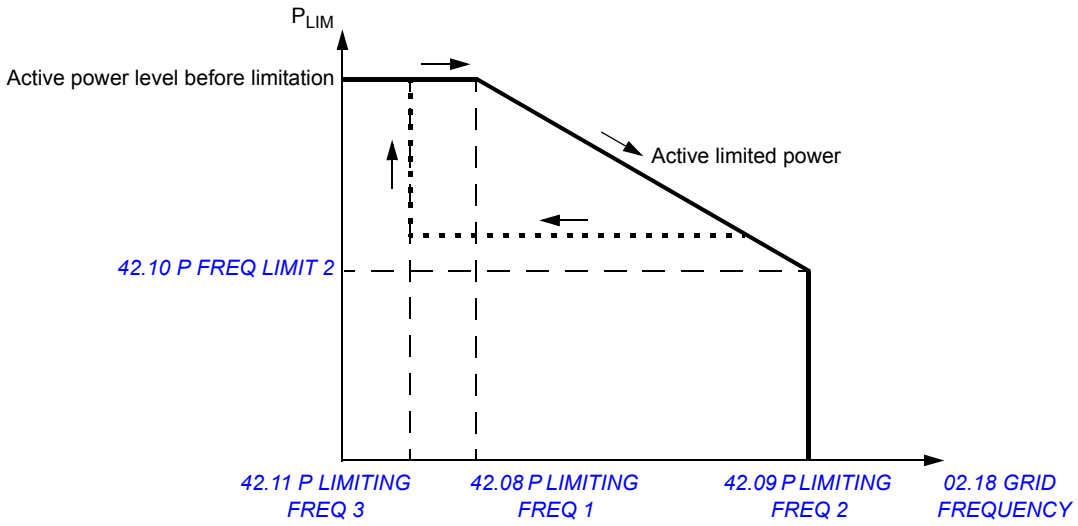
- Parameters *39.06 GRIDMON SUPV MODE* (page *127*), *39.07 GRIDMON RESTR DLY* (page *127*)
- Parameter group *44 GRID MONITORING* (page *134*)

Diagnostics

- Signals *01.11 MAINS VOLTAGE* (page *97*), *02.18 GRID FREQUENCY* (page *99*)
- Alarms *AC OVERVOLT (31A0)* (page *157*), *AC UNDERVOLT (31A1)* (page *157*), *AC OVERFREQ (31A2)* (page *157*), *AC UNDERFREQ (31A3)* (page *157*)
- Faults *AC OVERVOLT (3110)* (page *157*), *AC UNDERVOLT (3120)* (page *157*), *AC OVERFREQ (3141)* (page *157*), *AC UNDERFREQ (3142)* (page *157*)

Active power limitation from grid frequency

In some grid codes and standards it is required that active power is limited as grid frequency increases. The PVS800 has an adjustable active power limitation based on measured grid frequency. An example of such a limitation curve is shown below.


P_{LIM}
Active power level before limitation
Active limited power
42.10 P FREQ LIMIT 2
42.11 P LIMITING FREQ 3
42.08 P LIMITING FREQ 1
42.09 P LIMITING FREQ 2
02.18 GRID FREQUENCY

Normally the active power limitation curve is set during commissioning. If the curve is needed to be changed after commissioning, contact your local ABB representative for further instructions.

Active power ramp-up after a grid fault

If the PVS800 ends up with a grid fault and a new start is made after a fault reset, it is possible to limit active power with a ramp. When a fault has been cleared by resetting and the PVS800 has been started up again, it is possible to ramp up active power with ramp time *42.05 RESTR ACTPOW GRD1* (page *132*).

Grid faults are LVRT faults, external grid monitoring faults and NAMU grid monitoring faults. These faults are listed below:

RT NET LOST	(32A1)	9.11 SUPPLY FAULT WORD	bit 9
GRID MON FLT	(8189)	9.10 PV FLT ALM WORD	bit 0

AC UNDERFREQ	(3142)	9.01 FAULT WORD 1	bit 8
AC OVERFREQ	(3141)	9.01 FAULT WORD 1	bit 9
AC UNDERVOLT	(3120)	9.01 FAULT WORD 1	bit 10
AC OVERVOLT	(3110)	9.01 FAULT WORD 1	bit 11

Parameter *42.06 RESTR ACTPOW GRD2* (page *132*) can be used if active power must be ramped up after other faults or after a stop.

Settings

Parameters are visible but password-protected.

- Parameter for active power ramp-up when the PVS800 is started up after a grid fault: *42.05 RESTR ACTPOW GRD1* (page *132*)
- Parameter for active power ramp-up when the PVS800 is started up after other faults or a stop: *42.06 RESTR ACTPOW GRD2* (page *132*)

String monitoring

The inverter software includes a string monitoring functionality that is based on measured string currents inside junction boxes. Measured values are sent via Modbus to the inverter and stored to inverters parameters.

With the string monitoring function faulty strings can be detected based on the decreased string current. For more information, see *PVS-JB-8-M junction box with monitoring for PVS800 central inverters user's manual* (3AUA0000087106 [English]).

Settings

- See parameter groups *30 FAULT FUNCTIONS* (page *66*), *32 STRING BOX ADDR* (page *70*) and *33 STRING MON SET* (page *70*)
- For status information, see parameter groups *34 STRING MON STAT* (page *72*), *35 ENABLED STRINGS* (page *74*), *36 SBOX CUR DEV STA* (page *75*) and *40 STRING BOX 1 & 2* … *49 STRING BOX 19 & 20* (pages *75*…*78*)

Diagnostics

- Alarms: *SBOX 1 LINK (6195)* … *SBOX 20 LINK (61A8)* (page *156*)

Adaptive programming with DriveAP 2.x

Conventionally, the user can control the operation of the PVS800 by parameters. Each parameter has a fixed set of choices or a setting range, which makes programming easy but limits the choices. Adaptive programming makes free customization of the PVS800 master control program possible without the need for a special programming tool or language.

The adaptive program is built of standard function blocks included in the **master** control program (the **inverter** control program is not intended to be programmed this way). The DriveAP 2.x PC tool or the CDP 312R control panel is the programming tool.

The maximum size of the adaptive program is 10 blocks on 10 ms time level and 20 blocks on 100 ms time level. The user can document the program by drawing it on block diagram template sheets (maximum of 10 sheets).

For more information, see *Application guide: Adaptive program for PVS800 central inverters* (3AUA0000091276 [English]).

5

Master control program parameters

What this chapter contains

The chapter describes the parameters of the master control program of the PVS800. All connections discussed in the parameter descriptions of this chapter refer to those of the master control unit (RDCU unit, designation A43) unless otherwise indicated. This control unit is shown as “PVS800 PVA”, and has the ID number 1. The control program revision is of the format GSXR7xxx.

Parameter groups 10…99 are user-adjustable. Parameter groups 1…9 (actual signals) are only for monitoring (read-only, ie, no user setting is possible), though data can be written into the Control Words (parameter group 7) through an external control system. Parameter changes through DriveWindow or CDP 312R control panel are stored to the FPROM memory and changes through external control system are stored to the RAM memory.

Note: Some parameters cannot be changed when the PVS800 is running.

Terms and abbreviations

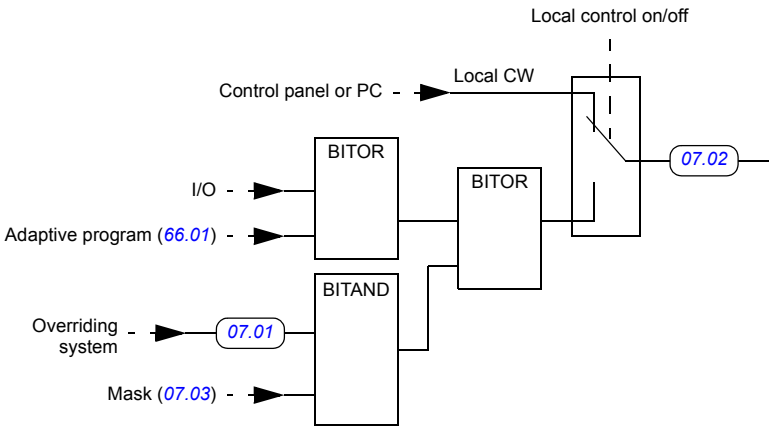
Term	Definition
Actual signal	Type of parameter that is the result of a measurement or calculation by the inverter. Actual signals can be monitored, but not adjusted, by the user. Parameter groups 1…9 typically contain actual signals.
B	Boolean
C	Character string
Def.	Default value
FbEq	Fieldbus equivalent: The scaling between the value shown on the panel and the integer used in serial communication. Serial communication data between fieldbus adapter and the control program is transferred in integer format. Thus, the actual and reference signal values are converted to 16-bit integer values. Fieldbus equivalent defines the scaling between the actual signal value in the control program and the integer equivalent used in serial communication. All the read and sent values are limited to 16 bits (-32768…32767). **Example 1:** If parameter *31.16 POWER LIMITING* in the master control program is set from an external control system, integer value 10000 corresponds to 100%.
I	Integer
P	Pointer
PB	Packed Boolean
R	Real
T	Data type (see B, C, I, R, PB)

Parameter groups 01…09

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td colspan="3">01 ACTUAL SIGNALS</td><td>Various actual signals</td><td></td></tr>
<tr><td>01.04</td><td>AC VOLTAGE L1</td><td>1 = 1 V</td><td>Measured grid voltage from the L1 phase</td><td>R</td></tr>
<tr><td>01.05</td><td>AC VOLTAGE L2</td><td>1 = 1 V</td><td>Measured grid voltage from the L2 phase</td><td></td></tr>
<tr><td>01.06</td><td>AC VOLTAGE L3</td><td>1 = 1 V</td><td>Measured grid voltage from the L3 phase</td><td></td></tr>
<tr><td>01.07</td><td>AC CURRENT L1</td><td>1 = 1 A</td><td>Measured output current</td><td>R</td></tr>
<tr><td>01.08</td><td>AC CURRENT L2</td><td>1 = 1 A</td><td>Reserved</td><td></td></tr>
<tr><td>01.09</td><td>AC CURRENT L3</td><td>1 = 1 A</td><td>Reserved</td><td></td></tr>
<tr><td>01.10</td><td>AC POWER</td><td>10 = 1 kW</td><td>Measured active power of the inverter (positive = power flow from inverter to grid, negative = power flow from grid to inverter)</td><td>R</td></tr>
<tr><td>01.11</td><td>AC POWER</td><td>100 = 1%</td><td>Measured active power in percent of nominal power (inverter unit parameter 04.06 CONV NOM POWER, page 100)</td><td>R</td></tr>
<tr><td>01.12</td><td>AC FREQUENCY</td><td>100 = 1 Hz</td><td>Measured grid frequency</td><td>R</td></tr>
<tr><td>01.13</td><td>COS PHI</td><td>100 = 1</td><td>Measured cosine phi</td><td>R</td></tr>
<tr><td>01.14</td><td>REACTIVE POWER</td><td>10 = 1 kVAr</td><td>Measured reactive power of the inverter (positive = capacitive, negative = inductive)</td><td>R</td></tr>
<tr><td>01.15</td><td>GRID IMPEDANCE</td><td>1 = 1 ohm</td><td>Reserved</td><td></td></tr>
<tr><td>01.16</td><td>INSUL RESISTANCE</td><td>1 = 1 kohm</td><td>Reserved</td><td></td></tr>
<tr><td>01.17</td><td>DC VOLTAGE</td><td>1 = 1 V</td><td>Reserved</td><td></td></tr>
<tr><td>01.18</td><td>DC CURRENT</td><td>1 = 1 A</td><td>Measured DC current</td><td>R</td></tr>
<tr><td>01.19</td><td>DC POWER</td><td>1 = 1 kW</td><td>Shows measured or estimated DC power. Selection between measured and estimated values can be done via parameter 14.14 DC POWER SELECT.</td><td>R</td></tr>
<tr><td>01.20</td><td>INV TEMPERATURE</td><td>1 = 1 °C</td><td>IGBT temperature of the inverter unit</td><td>R</td></tr>
<tr><td>01.21</td><td>INV STATUS</td><td>1 = 1</td><td>See parameter 08.04 PVA STATES (page 52).</td><td>I</td></tr>
<tr><td>01.22</td><td>INV FAILURE</td><td>1 = 1</td><td>Inverter fault word<table><tr><th>Bit</th><th>Value</th><th>Description</th></tr><tr><td rowspan="2">0</td><td>1</td><td>Inverter unit fault active</td></tr><tr><td>0</td><td>No inverter unit fault active</td></tr><tr><td>1…15</td><td colspan="2">Reserved</td></tr></table></td><td>PB</td></tr>
<tr><td>01.23</td><td>ALARM ACTIVE</td><td>1 = 1</td><td>Inverter alarm word<table><tr><th>Bit</th><th>Value</th><th>Description</th></tr><tr><td rowspan="2">0</td><td>1</td><td>Inverter unit alarm active</td></tr><tr><td>0</td><td>No inverter unit alarm active</td></tr><tr><td>1…15</td><td colspan="2">Reserved</td></tr></table></td><td>PB</td></tr>
<tr><td>01.24</td><td>MAIN STATUS WORD</td><td>1 = 1</td><td>See parameter 08.01 MAIN STATUS WORD (page 50).</td><td>PB</td></tr>
<tr><td>01.25</td><td>TIME OF USAGE</td><td>1 = 1 h</td><td>Elapsed time counter. Runs when the control unit of the inverter unit is powered.</td><td>I</td></tr>
<tr><td>01.26</td><td>ENERGY PRODUCED</td><td>1 = 100 kWh</td><td>Counts the kilowatt hours of power flow from inverter to grid. Counter can be reset by parameter 16.09 RESET COUNTER in the inverter control program (see page 116).</td><td>I</td></tr>
<tr><td>01.27</td><td>kWh COUNTER</td><td>1 = 1</td><td>Shows the kilowatts count from 01.26 ENERGY PRODUCED. After 999 kilowatts, this counter wraps around to 0 and 01.28 MWh COUNTER is incremented.</td><td>I</td></tr>
</table>

No.	Name/Value	FbEq	Description	T
01.28	MWh COUNTER	1 = 1	Shows the megawatts count from *01.26 ENERGY PRODUCED*. After 999 megawatts, this counter wraps around to 0 and *01.29 GWh COUNTER* is incremented.	I
01.29	GWh COUNTER	1 = 1	Shows the gigawatts count from *01.26 ENERGY PRODUCED*.	I
01.30	BREAKER COUNTER	1 = 1	Counts main contactor/breaker closures. Counter can be reset by parameter *16.09 RESET COUNTER* in the inverter control program (see page *116*).	I
01.31	DC BREAKER COUNTR	1 = 1	Counts DC breaker closures.	I
01.32	ENERGY LIMITING	1 = 1	Energy limit word **Bit** / **Value** / **Description** 0 / 1 / Power limitation active 1…15 / Reserved	PB
01.33	ENERGY LIM COUNTR	1 = 1	Reserved	
01.34	PV MODULE DC MEAS	1 = 1	Measured solar generator voltage. By default, this value is sent to the inverter unit as reference.	I
01.35	SOLAR RADIATION	1 = 1 W/m^2	Shows the value of the signal selected by parameter *14.01 SOLAR RADIATION* (see page *60*).	R
01.36	SOLAR IRRADIANCE	1 = 1 W/m^2	Shows the value of the signal selected by parameter *14.04 SOLAR IRRADIATION* (see page *60*).	R
01.37	PV MODULE TEMP	1 = 1 °C	Shows the value of the signal selected by parameter *14.07 PV MODULE TEMP* (see page *61*).	R
01.38	AMBIENT TEMP	1 = 1 °C	Shows the value of the signal selected by parameter *14.08 AMBIENT TEMP* (see page *61*).	R
01.39	EXTERNAL TEMP	1 = 1 °C	Shows the value of the signal selected by parameter *14.09 EXTERNAL TEMP* (see page *61*).	R
01.40	TRANSFORMER TEMP	1 = 1 °C	Shows the value of the signal selected by parameter *14.10 TRA OIL TEMP* (see page *61*).	R
01.41	TRANSF OIL LEV	1 = 1%	Shows the value of the signal selected by parameter *14.11 TRA OIL LEVEL* (see page *61*).	R
01.42	ISU ACTUAL 1	1 = 1	Data set 25, data word 1 transmitted by the inverter unit	I
01.43	ISU ACTUAL 2	1 = 1	Data set 25, data word 2 transmitted by the inverter unit	I
01.44	ISU ACTUAL 3	1 = 1	Data set 25, data word 3 transmitted by the inverter unit	I
02 ACTUAL SIGNALS			Various actual signals	
02.01	USED DC START LIM	1 = 1	Actual DC voltage start limit used (after photovoltaic cell temperature correction)	I
02.02	GND CURRENT ACT	1 = 0.02 mA	Displays the actual grounding current measured by a PGND board (option +F282 / +F283). If the grounding option is not installed, the value of this signal is irrelevant.	R
02.03	MAINS VOLTAGE	1 = 1 V	Displays a mains voltage signal from the inverter control program.	R
04 INFORMATION			Program versions, control board information	
04.01	SW PACKAGE VER	-	Displays the type and version of the firmware package. For PVS800 master control program revision 7xxx, the designation is GSXR7xxx.	C
04.02	DTC VERSION	-	Firmware version of a fixed part of the master control program that consists of operating system, communication control of the DDCS channels, and Modbus software of the control panel	C

No.	Name/Value	FbEq	Description	T
04.03	APPLIC NAME	-	Displays the type and the version of the control program.	C
04.04	BOARD TYPE	-	Control board type	C
04.05	INV NOM POWER	1 = 1	Nominal power of the inverter unit	R
05 ANALOGUE INPUTS			Values of analog inputs	
05.01	BASIC AI1		Value of control unit analog input AI1	I
	-20000…20000		Value	
05.02	BASIC AI2		Value of control unit analog input AI2	I
	-20000…20000		Value	
05.03	BASIC AI3		Value of control unit analog input AI3	I
	-20000…20000		Value	
05.04	EXT1 AI1		Value of extension module 1 analog input AI1	I
	-20000…20000		Value	
05.05	EXT1 AI2		Value of extension module 1 analog input AI2	I
	-20000…20000		Value	
05.06	EXT2 AI1		Value of extension module 2 analog input AI1	I
	-20000…20000		Value	
05.07	EXT2 AI2		Value of extension module 2 analog input AI2	I
	-20000…20000		Value	
05.08	EXT3 AI1		Value of extension module 3 analog input AI1	I
	-20000…20000		Value	
05.09	EXT3 AI2		Value of extension module 3 analog input AI2	I
	-20000…20000		Value	
05.10	EXT4 AI1		Value of extension module 4 analog input AI1	I
	-20000…20000		Value	
05.11	EXT4 AI2		Value of extension module 4 analog input AI2	I
	-20000…20000		Value	
05.12	EXT5 AI1		Value of extension module 5 analog input AI1	I
	-20000…20000		Value	
05.13	EXT5 AI2		Value of extension module 5 analog input AI2	I
	-20000…20000		Value	
06 ANALOGUE OUTPUTS			Values of analog outputs	
06.01	BASIC AO1	1 = 1483	Value of control unit analog output AO1	R
	0…22		Value	
06.02	BASIC AO2	1 = 1483	Value of control unit analog output AO2	R
	0…22		Value	
06.03	EXT1 AO1	1 = 1483	Value of extension module 1 analog output AO1	R
	0…22		Value	
06.04	EXT1 AO2	1 = 1483	Value of extension module 1 analog output AO2	R
	0…22		Value	
06.05	EXT2 AO1	1 = 1483	Value of extension module 2 analog output AO1	R
	0…22		Value	
06.06	EXT2 AO2	1 = 1483	Value of extension module 2 analog output AO2	R
	0…22		Value	
06.07	EXT3 AO1	1 = 1483	Value of extension module 3 analog output AO1	R
	0…22		Value	

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td>06.08</td><td>EXT3 AO2</td><td>1 = 1483</td><td>Value of extension module 3 analog output AO2</td><td>R</td></tr>
<tr><td></td><td>0…22</td><td></td><td>Value</td><td></td></tr>
<tr><td>06.09</td><td>EXT4 AO1</td><td>1 = 1483</td><td>Value of extension module 4 analog output AO1</td><td>R</td></tr>
<tr><td></td><td>0…22</td><td></td><td>Value</td><td></td></tr>
<tr><td>06.10</td><td>EXT4 AO2</td><td>1 = 1483</td><td>Value of extension module 4 analog output AO2</td><td>R</td></tr>
<tr><td></td><td>0…22</td><td></td><td>Value</td><td></td></tr>
<tr><td>06.11</td><td>EXT5 AO1</td><td>1 = 1483</td><td>Value of extension module 5 analog output AO1</td><td>R</td></tr>
<tr><td></td><td>0…22</td><td></td><td>Value</td><td></td></tr>
<tr><td>06.12</td><td>EXT5 AO2</td><td>1 = 1483</td><td>Value of extension module 5 analog output AO2</td><td>R</td></tr>
<tr><td></td><td>0…22</td><td></td><td>Value</td><td></td></tr>
<tr><td colspan="3">07 CONTROL WORDS</td><td>Control words.
Main Control Word (MCW) is the principal means of controlling the PVS800 from an overriding system.
Bits of the Main Control Word can be overridden locally using the control panel or a PC, the standard I/O, or an adaptive program. Master control program of the PVS800 switches between its states according to the bit-coded instructions of the final control word.</td><td></td></tr>
<tr><td>07.01</td><td>MAIN CTRL WORD</td><td></td><td>Main Control Word (MCW), received from the overriding control system (see also parameter 90.01 D SET 10 VAL 1).
<table>
<tr><th>Bit</th><th>Name</th><th>Value</th><th>Description</th></tr>
<tr><td>0</td><td>ON/OFF</td><td>0 ⇒1</td><td>Start charging (close charging contactors and main breakers)</td></tr>
<tr><td></td><td></td><td>0</td><td>Open main breakers</td></tr>
<tr><td>1, 2</td><td colspan="3">Reserved</td></tr>
<tr><td>3</td><td>START</td><td>1</td><td>Start modulation</td></tr>
<tr><td></td><td></td><td>0</td><td>Stop modulation</td></tr>
<tr><td>4…6</td><td colspan="3">Reserved</td></tr>
<tr><td>7</td><td>RESET</td><td>0 ⇒1</td><td>Reset</td></tr>
<tr><td>8…15</td><td colspan="3">Reserved</td></tr>
</table></td><td>PB</td></tr>
<tr><td>07.02</td><td>USED MCW</td><td></td><td>Shows the final control word that is used as the input for the PVS800 state machine (see page 30). For bit definitions, see parameter 07.01 MAIN CTRL WORD.
 
</td><td>PB</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td>07.03</td><td>MAIN CTRL W MASK</td><td></td><td>Mask word for control word 07.01 MAIN CTRL WORD. If the mask is not used, set to FFFF (65535 int.). If, for example, bit 0 is masked, set to FFFE (65534 int.). Several bits can be masked at the same time.
Mask function is needed if there is a need to share the control of bits between the overriding system and the adaptive program (or I/O control). See parameter 66.01 CW, and the block CW in the Application guide: Adaptive program for PVS800 central inverters (3AUA0000091276 [English]).
Bit Value
B0 0 = mask, 1 = no mask
B1 0 = mask, 1 = no mask
B2 0 = mask, 1 = no mask
… …
B15 0 = mask, 1 = no mask</td><td>PB</td></tr>
<tr><td>07.04</td><td>ISU MCW</td><td></td><td>Shows the Main Control Word in use for the inverter unit (modified from 07.02 USED MCW). This word is the output of the PVS800 state machine (see page 30). For bit definitions, see 07.01 MAIN CTRL WORD.</td><td>PB</td></tr>
<tr><td>07.05</td><td>GND CTRL WORD</td><td></td><td>Displays an internal control word of the DC grounding.
<table><tr><td>Bit 0</td><td>MPPT_MODE</td><td>1 = Inverter is in the MPPT mode.</td></tr><tr><td>Bit 1</td><td>INSULATION_OK</td><td>1 = Insulation is OK.</td></tr><tr><td>Bit 2</td><td>DC_TO_GROUND_VOLTAGE</td><td>1 = DC to the GND voltage is present.</td></tr><tr><td>Bit 3</td><td>START_REQUEST</td><td>1 = Start is requested.</td></tr></table></td><td>PB</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td colspan="3">08 STATUS WORDS</td><td>Status words. See also the control block diagrams in chapter Program features. Status Word (SW) is a word containing status information, sent by the PVS800 master control program to the external control system.</td><td></td></tr>
<tr><td>08.01</td><td>MAIN STATUS WORD</td><td></td><td>Main Status Word. Combined from the Status Word of the inverter unit, and communication faults. Sent to the overriding control system. See 92 D SET TR ADDR.
<table>
<tr><th>Bit</th><th>Name</th><th>Value</th><th>STATE/Description</th></tr>
<tr><td>0</td><td>RDY_ON</td><td>1</td><td>Ready to switch on = no fault</td></tr>
<tr><td></td><td></td><td>0</td><td>Not ready to switch on = fault</td></tr>
<tr><td>1</td><td>RDY_RUN</td><td>1</td><td>Ready to operate = DC bus charged</td></tr>
<tr><td></td><td></td><td>0</td><td>Not ready to operate</td></tr>
<tr><td>2</td><td>RDY_REF</td><td>1</td><td>Operation enabled</td></tr>
<tr><td></td><td></td><td>0</td><td>Operation inhibited</td></tr>
<tr><td>3</td><td>TRIPPED</td><td>1</td><td>Fault. See also FLT (xx) (page 153)</td></tr>
<tr><td>4…6</td><td>Reserved</td><td colspan="2"></td></tr>
<tr><td>7</td><td>ALARM</td><td>1</td><td>Warning. See also ALM (xx) (page 151)</td></tr>
<tr><td>8</td><td>MODULATING</td><td>1</td><td>Inverter is modulating.</td></tr>
<tr><td></td><td></td><td>0</td><td>Inverter is not modulating.</td></tr>
<tr><td>9</td><td>REMOTE</td><td>1</td><td>Control location: REMOTE</td></tr>
<tr><td></td><td></td><td>0</td><td>Control location: LOCAL</td></tr>
<tr><td>10</td><td>NET OK</td><td>1</td><td>Grid voltage is OK.</td></tr>
<tr><td></td><td></td><td>0</td><td>Grid voltage is lost.</td></tr>
<tr><td>11</td><td>Reserved</td><td colspan="2"></td></tr>
<tr><td>12</td><td>Reserved</td><td colspan="2"></td></tr>
<tr><td>13</td><td>CHARGING OR RDY_RUN</td><td></td><td>Combines bits 14 and 1.</td></tr>
<tr><td></td><td></td><td>1</td><td>Ready to operate = DC bus charged or charging contactor closed</td></tr>
<tr><td></td><td></td><td>0</td><td>Not ready to operate or charging contactor open</td></tr>
<tr><td>14</td><td>CHARGING</td><td>1</td><td>Charging contactor closed</td></tr>
<tr><td></td><td></td><td>0</td><td>Charging contactor open</td></tr>
<tr><td>15</td><td>Reserved</td><td colspan="2"></td></tr>
</table></td><td>PB</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td>08.02</td><td>DI STATUS WORD</td><td></td><td>Digital input status word:
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td colspan="2">Reserved</td></tr>
<tr><td>1</td><td>DI1</td><td>Status of digital input 1 of control unit</td></tr>
<tr><td>2</td><td>DI2</td><td>Status of digital input 2 of control unit</td></tr>
<tr><td>3</td><td>DI3</td><td>Status of digital input 3 of control unit</td></tr>
<tr><td>4</td><td>DI4</td><td>Status of digital input 4 of control unit</td></tr>
<tr><td>5</td><td>DI5</td><td>Status of digital input 5 of control unit</td></tr>
<tr><td>6</td><td>DI6</td><td>Status of digital input 6 of control unit</td></tr>
<tr><td>7</td><td>DI7 (DIIL)</td><td>Status of digital input 7 of control unit</td></tr>
<tr><td>8…15</td><td colspan="2">Reserved</td></tr>
</table></td><td>PB</td></tr>
<tr><td>08.03</td><td>EXT DI STATUS W</td><td></td><td>Extension module digital input status word. See also parameters 98.04…98.08.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td colspan="2">Reserved</td></tr>
<tr><td>1</td><td>EXT1_DI1</td><td>Digital input 1 status on RDIO extension module 1</td></tr>
<tr><td>2</td><td>EXT1_DI2</td><td>Digital input 2 status on RDIO extension module 1</td></tr>
<tr><td>3</td><td>EXT1_DI3</td><td>Digital input 3 status on RDIO extension module 1</td></tr>
<tr><td>4</td><td>EXT2_DI1</td><td>Digital input 1 status on RDIO extension module 2</td></tr>
<tr><td>5</td><td>EXT2_DI2</td><td>Digital input 2 status on RDIO extension module 2</td></tr>
<tr><td>6</td><td>EXT2_DI3</td><td>Digital input 3 status on RDIO extension module 2</td></tr>
<tr><td>7</td><td>EXT3_DI1</td><td>Digital input 1 status on RDIO extension module 3</td></tr>
<tr><td>8</td><td>EXT3_DI2</td><td>Digital input 2 status on RDIO extension module 3</td></tr>
<tr><td>9</td><td>EXT3_DI3</td><td>Digital input 3 status on RDIO extension module 3</td></tr>
<tr><td>10</td><td>EXT4_DI1</td><td>Digital input 1 status on RDIO extension module 4</td></tr>
<tr><td>11</td><td>EXT4_DI2</td><td>Digital input 2 status on RDIO extension module 4</td></tr>
<tr><td>12</td><td>EXT4_DI3</td><td>Digital input 3 status on RDIO extension module 4</td></tr>
<tr><td>13</td><td>EXT5_DI1</td><td>Digital input 1 status on RDIO extension module 5</td></tr>
<tr><td>14</td><td>EXT5_DI2</td><td>Digital input 2 status on RDIO extension module 5</td></tr>
<tr><td>15</td><td>EXT5_DI3</td><td>Digital input 3 status on RDIO extension module 5</td></tr>
</table></td><td>PB</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td>08.04</td><td>PVA STATES</td><td></td><td>Indicates the state of the master control program. See section PVS800 state machine on page 30.</td><td>I</td></tr>
<tr><td></td><td>STANDBY</td><td>1</td><td>Power on, no faults, inverter unit not in the local mode</td><td></td></tr>
<tr><td></td><td>SLEEP</td><td>2</td><td>Start on but all start conditions have not been met.</td><td></td></tr>
<tr><td></td><td>START ISU</td><td>3</td><td>Start on, all start conditions have been met. Start command sent to the inverter unit.</td><td></td></tr>
<tr><td></td><td>MPPT</td><td>4</td><td>Maximum power point tracking (MPPT) mode active. See section Maximum power point tracking (MPPT) on page 32.</td><td></td></tr>
<tr><td></td><td>ISU LOCAL</td><td>5</td><td>Inverter unit has been switched into the local control mode.</td><td></td></tr>
<tr><td></td><td>FAULTED</td><td>6</td><td>Fault has occurred.</td><td></td></tr>
<tr><td>08.05</td><td>PVA STATUS WORD</td><td></td><td>Master control program status word. See also parameter 08.04 PVA STATES, and section PVS800 state machine on page 30.
<table>
<tr><th>Bit</th><th>Name</th><th>Value</th><th>Description</th></tr>
<tr><td>0</td><td>MPPT</td><td>1</td><td>DC breaker closed, inverter running in the MPPT mode</td></tr>
<tr><td>1</td><td>LOCAL MODE</td><td>1</td><td>DC breaker open, inverter in the local mode, MPPT disabled</td></tr>
<tr><td>2</td><td>START MPPT</td><td>1</td><td>DC breaker closing, waiting to start the MPPT mode</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">RELAY INIT</td><td>0</td><td>Inverter unit initializing after loss of 24 V control unit power supply. The bit remains 0 for 45 seconds. Master control program remains in STANDBY state.</td></tr>
<tr><td>1</td><td>Inverter unit ready</td></tr>
<tr><td>4</td><td>DCBRK STA</td><td>1</td><td>DC breaker closed</td></tr>
<tr><td>5…15</td><td colspan="3">Reserved</td></tr>
</table></td><td>PB</td></tr>
<tr><td>08.06</td><td>GND STATE</td><td></td><td>Displays the state of the DC grounding state machine.
<table>
<tr><th>State</th><th>Name</th><th>Description</th></tr>
<tr><td>1</td><td>GROUNDING_OPEN</td><td>Grounding is open.</td></tr>
<tr><td>2</td><td>WAIT_INS_MEAS</td><td>Waiting for the insulation resistance measurement to be ready.</td></tr>
<tr><td>4</td><td>READ_INS_MEAS</td><td>Reading of the insulation resistance value.</td></tr>
<tr><td>8</td><td>CLOSING_GROUNDING</td><td>Grounding is commanded to be closed.</td></tr>
<tr><td>16</td><td>GROUNDING_CLOSED</td><td>Grounding is closed and the inverter start is allowed.</td></tr>
<tr><td>32</td><td>INVERTER_SLEEP</td><td>Inverter is in the sleep or standby mode.</td></tr>
<tr><td>64</td><td>GROUNDING_FAULTED</td><td>Grounding has faulted.</td></tr>
<tr><td>128</td><td>NOT_IN_USE</td><td>Grounding usage mode = OFF.</td></tr>
</table></td><td>I</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td>08.07</td><td>GND STATUS WORD</td><td></td><td>Displays a status word of the DC grounding.
<table>
<tr><td>Bit 0</td><td>ENABLE_DC_GND_MONITORING</td><td>1 = DC grounding monitoring is enabled.</td></tr>
<tr><td>Bit 1</td><td>DC_CONTACTOR_CLOSED</td><td>1 = Grounding contactor is closed.</td></tr>
<tr><td>Bit 2</td><td>START_ENABLE</td><td>1 = Inverter start is enabled.</td></tr>
<tr><td>Bit 3</td><td>ENABLE_DC_GND_CTRL</td><td>1 = DC grounding control is enabled.</td></tr>
<tr><td>Bit 4</td><td>MANUAL_CLOSED</td><td>1 = Grounding contactor is manually closed.</td></tr>
<tr><td>Bit 5</td><td>MANUAL_OPEN</td><td>1 = Grounding contactor is manually open.</td></tr>
<tr><td>Bit 6</td><td>OPEN_GND_ON_PVA_FAULT</td><td>1 = Grounding contactor is kept open when the inverter is in the faulted state.</td></tr>
</table></td><td>PB</td></tr>
<tr><td>08.08</td><td>LIMIT WORD</td><td>1 = 1</td><td>Limit word from the Inverter control program signal 08.03 LIMIT WORD.</td><td>PB</td></tr>
<tr><td colspan="3">09 FAULT WORDS</td><td>Fault words. For possible causes and remedies, see chapter Fault tracing.</td><td></td></tr>
<tr><td>09.10</td><td>IO FAULT WORD</td><td></td><td>Digital and analog extension module and control unit digital and analog I/O fault word:
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>DIO EXT1 ERROR</td><td>Error detected in digital extension module 1.</td></tr>
<tr><td>1</td><td>DIO EXT2 ERROR</td><td>Error detected in digital extension module 2.</td></tr>
<tr><td>2</td><td>DIO EXT3 ERROR</td><td>Error detected in digital extension module 3.</td></tr>
<tr><td>3</td><td>DIO EXT4 ERROR</td><td>Error detected in digital extension module 4.</td></tr>
<tr><td>4</td><td>DIO EXT5 ERROR</td><td>Error detected in digital extension module 5.</td></tr>
<tr><td>5</td><td>RMIO DIO ERROR</td><td>DIGITAL IO (5442) (page 152)</td></tr>
<tr><td>6</td><td>EXT RDIO ERROR</td><td>EXT DIO (7082) (page 153)</td></tr>
<tr><td>7</td><td colspan="2">Reserved</td></tr>
<tr><td>8</td><td>AIO EXT1 ERROR</td><td>Error detected in analog extension module 1.</td></tr>
<tr><td>9</td><td>AIO EXT2 ERROR</td><td>Error detected in analog extension module 2.</td></tr>
<tr><td>10</td><td>AIO EXT3 ERROR</td><td>Error detected in analog extension module 3.</td></tr>
<tr><td>11</td><td>AIO EXT4 ERROR</td><td>Error detected in analog extension module 4.</td></tr>
<tr><td>12</td><td>AIO EXT5 ERROR</td><td>Error detected in analog extension module 5.</td></tr>
<tr><td>13</td><td>RMIO AIO ERROR</td><td>ANALOG IO (5441) (page 151)</td></tr>
<tr><td>14</td><td>EXT RAIO ERROR</td><td>EXT AIO (7081) (page 153)</td></tr>
<tr><td>15</td><td colspan="2">Reserved</td></tr>
</table></td><td>PB</td></tr>
</table>

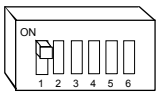
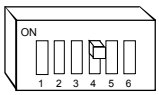
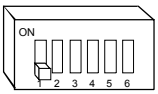
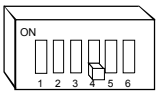
<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td>09.11</td><td>SUPPLY FAULT WORD</td><td></td><td>Inverter unit fault word. If the inverter unit consists of parallel-connected modules, a fault is indicated by this word if it is present in any module.
<table>
<tr><th>Bit</th><th>Fault</th></tr>
<tr><td>0</td><td>CHARGING FLT (3230) (page 159)</td></tr>
<tr><td>1</td><td>OVERCURRENT (2310) (page 164)</td></tr>
<tr><td>2</td><td>EXT EVENT DI5 (9085) (page 161)</td></tr>
<tr><td>3</td><td>PVS800 TEMP (4210) (page 165)</td></tr>
<tr><td>4</td><td>EXT EVENT DI4 (9084) (page 161)</td></tr>
<tr><td>5</td><td>DI1 (9088) (page 160)</td></tr>
<tr><td>6</td><td>MAIN CNT FLT (FF17) (page 163)</td></tr>
<tr><td>7</td><td>SHORT CIRC (2340) (page 166)</td></tr>
<tr><td>8</td><td>INTERNAL FAULT (page 163)</td></tr>
<tr><td>9</td><td>NET VOLT FLT (3100)/(32A2) (page 163)</td></tr>
<tr><td>10</td><td>COMM MODULE (7510) (page 159)</td></tr>
<tr><td>11</td><td>EXT EVNT DI7 (908E) (page 161)</td></tr>
<tr><td>12</td><td>EARTH FAULT (2387) (page 160)</td></tr>
<tr><td>13</td><td>SYNCHRO FLT (8180) (page 167)</td></tr>
<tr><td>14</td><td>DC UNDERVOLT (3220) (page 160)</td></tr>
<tr><td>15</td><td>DC OVERVOLT (3210) (page 159)</td></tr>
<tr><td colspan="2">Bit value: 1 = fault, 0 = no fault</td></tr>
</table></td><td>PB</td></tr>
<tr><td>09.12</td><td>SUPPLY ALARM WORD</td><td></td><td>Inverter unit alarm word. If the inverter unit consists of parallel-connected modules, an alarm is indicated by this word if it is present in any module.
<table>
<tr><th>Bit</th><th>Fault</th></tr>
<tr><td>0</td><td>COMM MODULE (7510) (page 159)</td></tr>
<tr><td>1</td><td>PANEL LOST (5300) (page 164)</td></tr>
<tr><td>2</td><td>DI1 (9081) (page 160)</td></tr>
<tr><td>3</td><td>AI<MIN FUNC (8110) (page 157)</td></tr>
<tr><td>4</td><td>PVS800 TEMP (4210) (page 165)</td></tr>
<tr><td>5</td><td>Reserved</td></tr>
<tr><td>6</td><td>PLIM EXT TMP (44A0) (page 164)</td></tr>
<tr><td>7</td><td>>QLIM EXT TMP (44AC) (page 155)</td></tr>
<tr><td>8</td><td>Reserved</td></tr>
<tr><td>9</td><td>RUN DISABLED (FFAC) (page 166)</td></tr>
<tr><td>10</td><td>NET LOST (32A3) (page 163)</td></tr>
<tr><td>11</td><td>EXT EVNT DI7 (908E) (page 161)</td></tr>
<tr><td>12</td><td>RECHARGE ALM (3250) (page 166)</td></tr>
<tr><td>13</td><td>EXT EVNT DI4 (908B) (page 161)</td></tr>
<tr><td>14</td><td>EXT EVNT DI5 (908C) (page 161)</td></tr>
<tr><td>15</td><td>Reserved</td></tr>
<tr><td colspan="2">Bit value: 1 = fault, 0 = no fault</td></tr>
</table></td><td>PB</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td>09.13</td><td>AP FW</td><td></td><td>Alarm and fault word for the user’s events used typically for fieldbus information in an adaptive program. Defined by function block A/F WORD. See Application guide: Adaptive program for PVS800 central inverters (3AUA0000091276 [English]).</td><td>PB</td></tr>
<tr><td>09.14</td><td>PVA FAULT WORD</td><td></td><td>Fault word:<table><tr><th>Bit</th><th>Fault</th></tr><tr><td>0</td><td>COMM MODULE (7510) (page 152)</td></tr><tr><td>1</td><td>CH2 COM LOSS (7520) (page 152)</td></tr><tr><td>2</td><td>>REVERSE POW (8187) (page 155)</td></tr><tr><td>3</td><td>>DC BRK TRP (8188) (page 152)</td></tr><tr><td>4</td><td>>GRID MONFLT (8189) (page 153)</td></tr><tr><td>5</td><td>>DC BRK LEV (818C) (page 152)</td></tr><tr><td>6</td><td>>DC BRK POS (818D) (page 152)</td></tr><tr><td>7</td><td>>BACKPOW LEV (818E) (page 151)</td></tr><tr><td>8</td><td>AUTORESET F (6080) (page 151)</td></tr><tr><td>9</td><td>EXT EVNT DI3 (9083) (page 153)</td></tr><tr><td>10</td><td>EXT EVNT DI4 (9084) (page 153)</td></tr><tr><td>11</td><td>EXT EVNT DI5 (9085) (page 153)</td></tr><tr><td>12</td><td>>ANTI-ISLAND (819F) (page 151)</td></tr><tr><td>12…15</td><td>Reserved</td></tr><tr><td colspan="2">Bit value: 1 = fault, 0 = no fault</td></tr></table></td><td>PB</td></tr>
<tr><td>09.15</td><td>PVA ALARM WORD</td><td></td><td>Alarm word:<table><tr><th>Bit</th><th>Alarm</th></tr><tr><td>0</td><td>Reserved</td></tr><tr><td>1</td><td>>PVS&PANEL DC (32A9) (page 155)</td></tr><tr><td>2</td><td>PVA RUN ENA (FF54) (page 155). See also parameter 08.05 PVA STATUS WORD bit 3.</td></tr><tr><td>3</td><td>AUTORESET A (6081) (page 151)</td></tr><tr><td>4</td><td>>POW IPPTMP (818F) (page 155)</td></tr><tr><td>5</td><td>>LOST ENERGY (8190) (page 154)</td></tr><tr><td>6</td><td>UDC HIGH LIM (32A7) (page 156)</td></tr><tr><td>7</td><td>EXT EVNT DI3 (9083) (page 153)</td></tr><tr><td>8</td><td>EXT EVNT DI4 (9084) (page 153)</td></tr><tr><td>9</td><td>EXT EVNT DI5 (9085) (page 153)</td></tr><tr><td>10…11</td><td>Reserved</td></tr><tr><td>11</td><td>RMBA LOST (61A9) (page 155)</td></tr><tr><td>12</td><td>APP OVERLOAD (FFD9) (page 151)</td></tr><tr><td>13</td><td>APPLIC 1 FLT (FFD6) (page 151)</td></tr><tr><td>14</td><td>APPLIC 2 FLT (FFD7) (page 151)</td></tr><tr><td>15</td><td>IO START ENA (61AA) (page 154)</td></tr><tr><td colspan="2">Bit value: 1 = alarm, 0 = no alarm</td></tr></table></td><td>PB</td></tr>
<tr><td>09.16</td><td>INV LAST FLT CODE</td><td>1 = 1</td><td>Shows the latest fault code of the inverter control unit.</td><td>PB</td></tr>
</table>

No.	Name/Value	FbEq	Description	T
09.17	PVA ALARM WORD 2	1 = 1	Alarm word Bit 0: *>MPPT MIN REF (32AD)* (page *154*) Bit 1: *>MPPT MAX REF (32AE)* (page *154*)	PB
09.20	FAULT CODE 1 LAST	1 = 1	Fieldbus code of the latest fault. See chapter *Fault tracing*.	PB
09.21	FAULT CODE 2 LAST	1 = 1	Fieldbus code of the 2nd latest fault. See chapter *Fault tracing*.	PB
09.22	FAULT CODE 3 LAST	1 = 1	Fieldbus code of the 3rd latest fault. See chapter *Fault tracing*.	PB
09.23	FAULT CODE 4 LAST	1 = 1	Fieldbus code of the 4th latest fault. See chapter *Fault tracing*.	PB
09.24	FAULT CODE 5 LAST	1 = 1	Fieldbus code of the 5th latest fault. See chapter *Fault tracing*.	PB
09.25	WARN CODE 1 LAST	1 = 1	Fieldbus code of the latest alarm. See chapter *Fault tracing*.	PB
09.26	WARN CODE 2 LAST	1 = 1	Fieldbus code of the 2nd latest alarm. See chapter *Fault tracing*.	PB
09.27	WARN CODE 3 LAST	1 = 1	Fieldbus code of the 3rd latest alarm. See chapter *Fault tracing*.	PB
09.28	WARN CODE 4 LAST	1 = 1	Fieldbus code of the 4th latest alarm. See chapter *Fault tracing*.	PB
09.29	WARN CODE 5 LAST	1 = 1	Fieldbus code of the 5th latest alarm. See chapter *Fault tracing*.	PB

Parameter groups 10…99

No.	Name/Value	FbEq	Description	Def	T
10 CMD GROUP			Special commands		
10.01	RESET CMD		By setting this parameter to *RESET*, the reset command is sent to a faulted inverter unit. Value returns to *NOT SET* automatically after *RESET*.	NOT SET	B
	NOT SET	0			
	RESET	65535			
10.02	ENABLE I/O CTRL		Enables/disables the I/O control, ie, PVS800 control through digital inputs. When the I/O control is enabled, start/stop and reset signals are read from inputs that are defined by parameters *10.04 I/O START SOURCE* and *10.05 I/O RESET SOURCE*. I/O control is parallel to the fieldbus and adaptive control words (see parameter *07.02 USED MCW*). Local control overrides I/O control.	NO	B
	NO	0	I/O control disabled		
	YES	1	I/O control enabled		
10.03	EM STOP AUTORESET		Enables/disables an automatic reset of the emergency stop circuit. See *Hardware manual* of the PVS800. If enabled, digital output DO1 cannot be used for other purposes.	NO	I
	NO	1	Automatic reset disabled		
	DO1	2	Automatic reset of emergency stop circuit enabled through digital output DO1. Reset pulse is active for 4 seconds after the auxiliary power has been switched on.		
10.04	I/O START SOURCE		Defines the source of the start/stop signal in I/O control (see parameter *10.02 ENABLE I/O CTRL*). **WARNING!** If the I/O control is enabled and a start command is active, the PVS800 will start after the auxiliary power to the control units has switched on. Default source is digital input DI2 on the master control unit.	+.008.002.02	P
	-255.255.31 … +255.255.31 / C. -32768 … C. 32767		Parameter pointer: Inversion, group, index and bit fields. Bit number is effective only for blocks handling Boolean inputs.		
10.05	I/O RESET SOURCE		Defines the source of the reset signal in the I/O control (see parameter *10.02 ENABLE I/O CTRL*). Default source is digital input DI1 on the master control unit.	+.008.002.01	P
	-255.255.31 … +255.255.31 / C. -32768 … C. 32767		Parameter pointer: Inversion, group, index and bit fields. Bit number is effective only for blocks handling Boolean inputs.		
13 ANALOGUE INPUTS			Configuration of analog inputs		
13.01	AI1 CONV MODE		Defines the conversion mode for analog input AI1. **Note:** Analog input AI1 is reserved for DC current measurement. Do not change the value of this parameter.	NOR-MAL	I
	NORMAL	1	Normal scaling: -10 V … 0 … 10 V = -20000…0…20000		
13.02	AI1 FILTER ms		Defines the filter time constant in milliseconds for analog input AI1. **Note:** Analog input AI1 is reserved for DC current measurement. Do not change the value of this parameter.	1000	I
	1…30000	1 = 1 ms	Value		

No.	Name/Value	FbEq	Description	Def	T
13.03	AI2 CONV MODE		Defines the conversion mode for analog input AI2.	NOR-MAL	I
	NORMAL	1	Normal scaling: -20 mA … 0 … 20 mA = -20000…0…20000		
	4 mA	2	4 mA scaling: 4 mA … 20 mA = 0…20000		
13.04	AI2 FILTER ms		Defines the filter time constant in milliseconds for analog input AI2.	1	I
	1…30000	1 = 1 ms	Value		
13.05	AI3 CONV MODE		Defines the conversion mode for analog input AI3.	NOR-MAL	I
	NORMAL	1	Normal scaling: -20 mA … 0 … 20 mA = -20000…0…20000		
	4 mA	2	4 mA scaling: 4 mA … 20 mA = 0…20000		
13.06	AI3 FILTER ms		Defines the filter time constant in milliseconds for analog input AI3.	1000	I
	1…30000	1 = 1 ms	Value		
13.15	EXT1 AI1 HW MODE		Configures the inputs and outputs of an RAIO analog I/O extension module. Operating mode of the analog inputs can be selected by using the configuration DIP switch (S2) on the circuit board of the module. Parameters must be set accordingly. RAIO-01 switch S2 settings (operating mode): Bipolar mode (positive and negative signals) ±0(4)…20 mA ±0(2)…10 V ±0…2 V Analog input AI1 Analog input AI2   Unipolar mode (positive signals only) Default 0(4)…20 mA 0(2)…10 V 0…2 V Analog input AI1 Analog input AI2  	UNIPO-LAR	I
	UNIPOLAR	1	Unipolar input mode		
	BIPOLAR	2	Bipolar input mode		
13.16	EXT1 AI2 HW MODE		See parameter *13.15 EXT1 AI1 HW MODE*.	UNIPO-LAR	I
	UNIPOLAR	1	Unipolar input mode		
	BIPOLAR	2	Bipolar input mode		

No.	Name/Value	FbEq	Description	Def	T
13.17	EXT1 AI1 CONV MOD		Defines the conversion mode for extension module 1 analog input AI1. Scaling is the same in both conversion modes (unipolar, bipolar).	NOR-MAL	I
	NORMAL	1	Normal scaling: -20 mA / -2 V / -10 V … 0 … 20 mA / 2 V / 10 V = -20000 … 0 … 20000		
	4 mA	2	4 mA scaling: 4…20 mA = 0…20000		
	PT100	3	Scaling with Pt100 temperature measurement: 200 °C = 20000 if analog output feeds the following constant current to the Pt100 sensor: with 1 × Pt100: = 10 mA with 2 × Pt100: = 5 mA with 3 × Pt100: = 3.3 mA.		
13.18	EXT1 AI2 CONV MOD		See parameter *13.17 EXT1 AI1 CONV MOD*.	NOR-MAL	I
13.19	EXT1 AI1 FILT ms		Defines the filter time constant in milliseconds for external module 1 analog input AI1.	1000	I
	0…30000	1 = 1 ms	Value		
13.20	EXT1 AI2 FILT ms		Defines the filter time constant in milliseconds for external module 1 analog input AI2.	1000	I
	0…30000	1 = 1 ms	Value		
13.21	EXT2 AI1 HW MODE		See parameter *13.15 EXT1 AI1 HW MODE*.	UNIPO-LAR	I
13.22	EXT2 AI2 HW MODE		See parameter *13.15 EXT1 AI1 HW MODE*.	UNIPO-LAR	I
13.23	EXT2 AI1 CONV MOD		See parameter *13.17 EXT1 AI1 CONV MOD*.	NOR-MAL	I
13.24	EXT2 AI2 CONV MOD		See parameter *13.17 EXT1 AI1 CONV MOD*.	NOR-MAL	I
13.25	EXT2 AI1 FILT ms		Defines the filter time constant in milliseconds for external module 2 analog input AI1.	1000	I
	0…30000	1 = 1 ms	Value		
13.26	EXT2 AI2 FILT ms		Defines the filter time constant in milliseconds for external module 2 analog input AI2.	1000	I
	0…30000	1 = 1 ms	Value		
13.27	EXT3 AI1 HW MODE		See parameter *13.15 EXT1 AI1 HW MODE*.	UNIPO-LAR	I
13.28	EXT3 AI2 HW MODE		See parameter *13.15 EXT1 AI1 HW MODE*.	UNIPO-LAR	I
13.29	EXT3 AI1 CONV MOD		See parameter *13.17 EXT1 AI1 CONV MOD*.	NOR-MAL	I
13.30	EXT3 AI2 CONV MOD		See parameter *13.17 EXT1 AI1 CONV MOD*.	NOR-MAL	I
13.31	EXT3 AI1 FILT ms		Defines the filter time constant in milliseconds for external module 3 analog input AI1.	1000	I
	0…30000	1 = 1 ms	Value		
13.32	EXT3 AI2 FILT ms		Defines the filter time constant in milliseconds for external module 3 analog input AI2.	1000	I
	0…30000	1 = 1 ms	Value		
13.33	EXT4 AI1 HW MODE		See parameter *13.15 EXT1 AI1 HW MODE*.	UNIPO-LAR	I

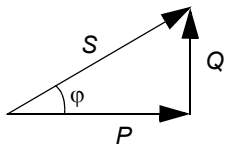
No.	Name/Value	FbEq	Description	Def	T
13.34	EXT4 AI2 HW MODE		See parameter *13.15 EXT1 AI1 HW MODE*.	UNIPO-LAR	I
13.35	EXT4 AI1 CONV MOD		See parameter *13.17 EXT1 AI1 CONV MOD*.	NOR-MAL	I
13.36	EXT4 AI2 CONV MOD		See parameter *13.17 EXT1 AI1 CONV MOD*.	NOR-MAL	I
13.37	EXT4 AI1 FILT ms		Defines the filter time constant in milliseconds for external module 4 analog input AI1.	1000	I
	0…30000	1 = 1 ms	Value		
13.38	EXT4 AI2 FILT ms		Defines the filter time constant in milliseconds for external module 4 analog input AI2.	1000	I
	0…30000	1 = 1 ms	Value		
13.39	EXT5 AI1 HW MODE		See parameter *13.15 EXT1 AI1 HW MODE*.	UNIPO-LAR	I
13.40	EXT5 AI2 HW MODE		See parameter *13.15 EXT1 AI1 HW MODE*.	UNIPO-LAR	I
13.41	EXT5 AI1 CONV MOD		See parameter *13.17 EXT1 AI1 CONV MOD*.	NOR-MAL	I
13.42	EXT5 AI2 CONV MOD		See parameter *13.17 EXT1 AI1 CONV MOD*.	NOR-MAL	I
13.43	EXT5 AI1 FILT ms		Defines the filter time constant in milliseconds for external module 5 analog input AI1.	1000	I
	0…30000	1 = 1 ms	Value		
13.44	EXT5 AI2 FILT ms		Defines the filter time constant in milliseconds for external module 5 analog input AI2.	1000	I
	0…30000	1 = 1 ms	Value		
14 ACT SIGNAL SEL			Source selection for various actual signals		
14.01	SOLAR RADIATION		Defines a source signal that is linearly scaled by parameters *14.02 SOLAR RADIAT MIN* and *14.03 SOLAR RADIAT MAX*, and then shown by parameter *01.35 SOLAR RADIATION*.	+.000.000.00	P
	-255.255.31 … +255.255.31 / C. -32768 … C. 32767		Parameter pointer or a constant value: • Parameter pointer: Inversion, group, index and bit fields. Bit number is effective only for blocks handling Boolean inputs. • Constant value: Inversion and constant fields. Inversion field must have value C to enable the constant setting.		
14.02	SOLAR RADIAT MIN		Defines the value displayed by *01.35 SOLAR RADIATION* when the source signal selected by *14.01 SOLAR RADIATION* is 0.	0	I
	-32768…32767	1 = 1	Display value corresponding to signal value of 0		
14.03	SOLAR RADIAT MAX		Defines the value displayed by *01.35 SOLAR RADIATION* when the source signal selected by *14.01 SOLAR RADIATION* is 20000.	20000	I
	-32768…32767	1 = 1	Display value corresponding to signal value of 20000		
14.04	SOLAR IRRADIATION		Defines a source signal that is linearly scaled by parameters *14.05 SOLAR IRRAD MIN* and *14.06 SOLAR IRRAD MAX*, and then shown by parameter *01.36 SOLAR IRRADIANCE*.	+.000.000.00	P
	-255.255.31 … +255.255.31 / C. -32768 … C. 32767		Parameter pointer or a constant value: • Parameter pointer: Inversion, group, index and bit fields. Bit number is effective only for blocks handling Boolean inputs. • Constant value: Inversion and constant fields. Inversion field must have value C to enable the constant setting.		

No.	Name/Value	FbEq	Description	Def	T
14.05	SOLAR IRRAD MIN		Defines the value displayed by *01.36 SOLAR IRRADIANCE* when the source signal selected by *14.04 SOLAR IRRADIATION* is 0.	0	I
	-32768…32767	1 = 1	Display value corresponding to signal value of 0		
14.06	SOLAR IRRAD MAX		Defines the value displayed by *01.36 SOLAR IRRADIANCE* when the source signal selected by *14.04 SOLAR IRRADIATION* is 20000.	20000	I
	-32768…32767	1 = 1	Display value corresponding to signal value of 20000		
14.07	PV MODULE TEMP		Defines a source signal that is shown by parameter *01.37 PV MODULE TEMP*.	+.000.000.00	P
	-255.255.31 … +255.255.31 / C. -32768 … C. 32767		Parameter pointer or a constant value: • Parameter pointer: Inversion, group, index and bit fields. Bit number is effective only for blocks handling Boolean inputs. • Constant value: Inversion and constant fields. Inversion field must have value C to enable the constant setting.		
14.08	AMBIENT TEMP		Defines a source signal that is shown by parameter *01.38 AMBIENT TEMP*.	+.000.000.00	P
	-255.255.31 … +255.255.31 / C. -32768 … C. 32767		Parameter pointer or a constant value: • Parameter pointer: Inversion, group, index and bit fields. Bit number is effective only for blocks handling Boolean inputs. • Constant value: Inversion and constant fields. Inversion field must have value C to enable the constant setting.		
14.09	EXTERNAL TEMP		Defines a source signal that is shown by parameter *01.39 EXTERNAL TEMP*.	+.000.000.00	P
	-255.255.31 … +255.255.31 / C. -32768 … C. 32767		Parameter pointer or a constant value: • Parameter pointer: Inversion, group, index and bit fields. Bit number is effective only for blocks handling Boolean inputs. • Constant value: Inversion and constant fields. Inversion field must have value C to enable the constant setting.		
14.10	TRA OIL TEMP		Defines a source signal that is shown by parameter *01.40 TRANSFORMER TEMP*.	+.000.000.00	P
	-255.255.31 … +255.255.31 / C. -32768 … C. 32767		Parameter pointer or a constant value: • Parameter pointer: Inversion, group, index and bit fields. Bit number is effective only for blocks handling Boolean inputs. • Constant value: Inversion and constant fields. Inversion field must have value C to enable the constant setting.		
14.11	TRA OIL LEVEL		Defines a source signal that is linearly scaled by parameters *14.12 TRA OIL LEVEL MIN* and *14.13 TRA OIL LEVEL MAX*, and then shown by parameter *01.41 TRANSF OIL LEV*.	+.000.000.00	P
	-255.255.31 … +255.255.31 / C. -32768 … C. 32767		Parameter pointer or a constant value: • Parameter pointer: Inversion, group, index and bit fields. Bit number is effective only for blocks handling Boolean inputs. • Constant value: Inversion and constant fields. Inversion field must have value C to enable the constant setting.		
14.12	TRA OIL LEVEL MIN		Defines the value displayed by *01.41 TRANSF OIL LEV* when the source signal selected by *14.11 TRA OIL LEVEL* is 0.	0	I
	-32768…32767	1 = 1	Display value corresponding to signal value of 0		
14.13	TRA OIL LEVEL MAX		Defines the value displayed by *01.41 TRANSF OIL LEV* when the source signal selected by *14.11 TRA OIL LEVEL* is 20000.	20000	I
	-32768…32767	1 = 1	Display value corresponding to signal value of 20000		

No.	Name/Value	FbEq	Description	Def	T
14.14	DC POWER SELECT		Selection between measured and estimated DC power.	MEA-SURED	
	MEASURED	1	*01.19 DC POWER* = *01.34 PV MODULE DC MEAS* x *01.18 DC CURRENT* / 1000		
	ESTIMATED	2	*01.19 DC POWER* = Estimated DC power from the inverter control program.		
15 ANALOGUE OUTPUTS			It is possible to select a signal or parameter to control the analog outputs. Outputs can also be controlled from an overriding system.		
15.01	AO1 OFFSET		Defines analog output AO1 signal offset in milliamperes.	0 mA	R
	0 mA … 20 mA	1 mA = 1000	Value		
15.02	AO1 SCALE		Defines the scale for analog output AO1. Defines the integer value that corresponds to the maximum output current (20 mA), eg, 20000 (default) = 20 mA.	20000	I
	0…30000		Integer value		
15.03	AO2 OFFSET		See parameter *15.01 AO1 OFFSET*.	0 mA	R
	0 mA … 20 mA	1 mA = 1000	Value		
15.04	AO2 SCALE		See parameter *15.02 AO1 SCALE*.	20000	I
	0…30000		Integer value		
15.05	EXT1 AO1 OFFSET		See parameter *15.01 AO1 OFFSET*.	0 mA	R
	0 mA … 20 mA	1 mA = 1000	Value		
15.06	EXT1 AO1 SCALE		See parameter *15.02 AO1 SCALE*.	20000	I
	0…30000		Integer value		
15.07	EXT1 AO2 OFFSET		See parameter *15.01 AO1 OFFSET*.	0 mA	R
	0 mA … 20 mA	1 mA = 1000	Value		
15.08	EXT1 AO2 SCALE		See parameter *15.02 AO1 SCALE*.	20000	I
	0…30000		Integer value		
15.09	EXT2 AO1 OFFSET		See parameter *15.01 AO1 OFFSET*.	0 mA	R
	0 mA … 20 mA	1 mA = 1000	Value		
15.10	EXT2 AO1 SCALE		See parameter *15.02 AO1 SCALE*.	20000	I
	0…30000		Integer value		
15.11	EXT2 AO2 OFFSET		See parameter *15.01 AO1 OFFSET*.	0 mA	R
	0 mA … 20 mA	1 mA = 1000	Value		
15.12	EXT2 AO2 SCALE		See parameter *15.02 AO1 SCALE*.	20000	I
	0…30000		Integer value		
15.13	EXT3 AO1 OFFSET		See parameter *15.01 AO1 OFFSET*.	0 mA	R
	0 mA … 20 mA	1 mA = 1000	Value		
15.14	EXT3 AO1 SCALE		See parameter *15.02 AO1 SCALE*.	20000	I
	0…30000		Integer value		
15.15	EXT3 AO2 OFFSET		See parameter *15.01 AO1 OFFSET*.	0 mA	R
	0 mA … 20 mA	1 mA = 1000	Value		

No.	Name/Value	FbEq	Description	Def	T
15.16	EXT3 AO2 SCALE		See parameter *15.02 AO1 SCALE*.	20000	I
	0…30000		Integer value		
15.17	EXT4 AO1 OFFSET		See parameter *15.01 AO1 OFFSET*.	0 mA	R
	0 mA … 20 mA	1 mA = 1000	Value		
15.18	EXT4 AO1 SCALE		See parameter *15.02 AO1 SCALE*.	20000	I
	0…30000		Integer value		
15.19	EXT4 AO2 OFFSET		See parameter *15.01 AO1 OFFSET*.	0 mA	R
	0 mA … 20 mA	1 mA = 1000	Value		
15.20	EXT4 AO2 SCALE		See parameter *15.02 AO1 SCALE*.	20000	I
	0…30000		Integer value		
15.21	EXT5 AO1 OFFSET		See parameter *15.01 AO1 OFFSET*.	0 mA	R
	0 mA … 20 mA	1 mA = 1000	Value		
15.22	EXT5 AO1 SCALE		See parameter *15.02 AO1 SCALE*.	20000	I
	0…30000		Integer value		
15.23	EXT5 AO2 OFFSET		See parameter *15.01 AO1 OFFSET*.	0 mA	R
	0 mA … 20 mA	1 mA = 1000	Value		
15.24	EXT5 AO2 SCALE		See parameter *15.02 AO1 SCALE*.	20000	I
	0…30000		Integer value		
16 SYSTEM CTR INPUT			Parameter lock, local lock, parameter backup		
16.01	LOCAL CTRL LOST		Defines the action taken when the communication with the local control device (control panel or PC tool) is lost.	NO ACTION	I
	NO ACTION	1	Loss of local control device does not cause an alarm or fault, or stop the master control program. **WARNING!** The PVS800 cannot be stopped if the master control program is set to the local control mode and the control device is not available.		
	STOP PVA	2	Loss of local control device causes an alarm and stops the master control program.		
16.02	PARAMETER LOCK		Selects the state of the parameter lock. With the parameter lock, you can prevent unauthorized changes by CDP 312R or the DriveWindow tool for parameter groups 0…99.	OPEN	B
	LOCKED	65535	Parameter changes are disabled.		
	OPEN	0	Parameter changes are enabled.		
16.03	PASS CODE		Selects the pass code for the parameter lock. Default value of this parameter is 0. To open the parameter lock, change the value to 358. After the parameter lock is opened, the value changes automatically back to 0.	0	I
	0…30000	1 = 1			
16.04	LOCAL LOCK		Disables entering the local control mode (***LOC/REM*** key on the panel). **WARNING!** Before activating, ensure that the control panel is not needed for stopping the PVS800!	FALSE	B
	FALSE	0	Local control allowed		
	TRUE	65535	Local control disabled		

No.	Name/Value	FbEq	Description	Def	T
16.05	PARAMETER BACKUP		Saves parameters from the RAM memory to the FPROM memory. Saving of parameters is needed only when parameter changes through an external control system have to be stored to the FPROM memory. **Note:** Parameter changes via the control panel or DriveWindow are immediately saved to the FPROM memory.	DONE	I
	DONE	0	Parameter saving has been completed.		
	SAVE	1	Parameters are being saved to the FPROM memory.		
19 DATA STORAGE			These parameters are used as auxiliary data storage locations. Parameter group consists of unconnected parameters for linking, testing and commissioning purposes.		
19.01	DATA 1		Storage parameter for receiving from or sending to the overriding system. For example, if the signal from data set 10 word 3 (DW 10.3) is required for monitoring by DriveWindow, first set parameter *90.03 D SET 10 VAL 3* to 1901 (denoting parameter 19.01), then select parameter *19.01 DATA 1* for the desired DriveWindow monitoring channel.	0	I
	-32768…32767	1 = 1	Value		
19.02	DATA 2		See parameter *19.01 DATA 1*.	0	I
	-32768…32767	1 = 1	Value		
…	…	…	…	…	
19.10	DATA 10		See parameter *19.01 DATA 1*.	0	I
	-32768…32767	1 = 1	Value		
19.11	NV STORE 1		Non-volatile storage 1 for any data in power shutdown. Data is written to this index and after power up it can ONCE be read from par. *19.13 STORED DATA 1*. **Note:** Requires that an RAPI-01C Auxiliary Power Interface module is fitted to the control unit.	0	I
	-32768…32767	1 = 1	Value		
19.12	NV STORE 2		Non-volatile storage 2 for any data in power shutdown. Data is written to this index and after power up it can ONCE be read from par. *19.14 STORED DATA 2*. **Note:** Requires that an RAPI-01C Auxiliary Power Interface module is fitted to the control unit.	0	I
	-32768…32767	1 = 1	Value		
19.13	STORED DATA 1		Non-volatile storage 1 for any data in power shutdown. Data type is unsigned integer. Stored data 1 (Par. *19.11 NV STORE 1*) can ONCE be read after power up from this parameter. **Note:** Requires that an RAPI-01C Auxiliary Power Interface module is fitted to the control unit.	0	I
	-32768…32767	1 = 1	Value		
19.14	STORED DATA 2		Non-volatile storage 2 for any data in power shutdown. Data type is unsigned integer. Stored data 2 (Par. *19.12 NV STORE 2*) can ONCE be read after power up from this parameter. **Note:** Requires that an RAPI-01C Auxiliary Power Interface module is fitted to the control unit.	0	I
	-32768…32767	1 = 1	Value		
19.15	DATA PB 1		Packed Boolean-type storage parameter for receiving from or sending to the overriding system. See parameter *19.01 DATA 1*.	0	PB
	0…65535	1 = 1	Value		

No.	Name/Value	FbEq	Description	Def	T
19.16	DATA PB 2		Packed Boolean-type storage parameter for receiving from or sending to the overriding system. See parameter *19.01 DATA 1*.	0	PB
	0…65535	1 = 1	Value		
23 DC VOLT REF			External DC voltage reference		
23.01	EXT MPPT DC REF		Shows the external DC voltage reference received from an overriding control device. External reference is used instead of the internal MPPT reference if enabled in the inverter control program. See inverter unit control program parameter *39.08 ENA EXT DC REF* (page *127*).	0	I
	0…1500	1 = 1	Reference value		
24 REACTIVE POWER			Reactive power compensation. See also section *Reactive power control* on page *34*.		
24.02	Q POWER REF		Defines a reference value for reactive power generation. Reference unit can be selected by parameter *24.03 Q POWER REF SEL*.	0	I
	-32768….32767 (equals -327.68…327.67%)	1 = 1	Reference value when parameter *24.03 Q POWER REF SEL* is set to PERCENT. **Example:** When parameter *24.03 Q POWER REF SEL* is set to *PERCENT*, value 10000 in parameter 24.02 Q POWER REF equals to 100% of inverter nominal power.		
	-32768….32767 (equals -32768…32767 kVAr)	1 = 1	Reference value when parameter *24.03 Q POWER REF SEL* is set to kVAr. **Example:** When parameter *24.03 Q POWER REF SEL* is set to *kVAr*, value 100 in parameter 24.02 Q POWER REF equals to 100 kVAr.		
	-3000…3000 (equals -30…30 deg)	1 = 1	Reference value when parameter *24.03 Q POWER REF SEL* is set to PHI. **Example:** When parameter *24.03 Q POWER REF SEL* is set to *PHI*, value 500 in parameter 24.02 Q POWER REF equals to cos (φ) = 5°: $\cos(\varphi) = \frac{P}{S} = \frac{P}{\sqrt{P^2 + Q^2}}$  Positive reference denotes capacitive load. Negative reference denotes inductive load. Values of parameter 24.02 Q POWER REF are converted to degrees by the control program: -3000…3000 ≙ -30°…30°. Values above 3000 or below -3000 equal -30°/30°, since the range is limited to -3000/3000.		
	-8600…-9999 (equals -0.86…-0.9999) and 8600…10000 (equals 0.86…1.0000)	1 = 1	Reference value when parameter *24.03 Q POWER REF SEL* is set to *COSPHI*. Positive reference denotes capacitive load. Negative reference denotes inductive load.		
	9000…10000…11000 (equals 90…100…110% of *04.04 CONV NOM VOLTAGE*)	1 = 1	Defines the nominal voltage (ie, the voltage when the reactive power reference is zero) when parameter *24.03 Q POWER REF SEL* is set to *Q(U) REF*.		

No.	Name/Value	FbEq	Description	Def	T
24.03	Q POWER REF SEL		Selects the reference unit for parameter *24.02 Q POWER REF*.	kVAr	I
	PERCENT	1	In percent of nominal power		
	kVAr	2	kVar		
	PHI	3	Angle phi		
	COSPHI	4	Cosphi		
	IQ REF	5	Reactive current reference selection		
	AC REF	6	AC voltage control reference selection		
	Q(U) REF	7	Q(U) control reference selection		
25 DC GROUNDING			Parameter group for DC grounding settings		
25.01	GND MODE SELECT		Defines a usage mode of the DC grounding.	OFF	I
	OFF	0	DC grounding control is disabled.		
	AUTO	1	DC grounding control is enabled.		
	CONT CLOSED	2	DC grounding contactor is manually closed (no monitoring).		
	CONT OPEN	3	DC grounding contactor is manually open (no monitoring).		
30 FAULT FUNCTIONS			Programmable protective functions		
30.01	DI3 EXT EVENT		Selects how the master control program reacts to the “0” state of digital input DI3.	DI3=0 ALARMS	I
	NO	1	No action		
	DI3=0 ALARMS	2	If the digital input switches to 0, an alarm is given.		
	DI3=0 FAULTS	3	If the digital input switches to 0, the master control program trips on a fault.		
30.02	DI4 EXT EVENT		Selects how the master control program reacts to the “0” state of digital input DI4.	DI4=0 ALARMS	I
	NO	1	No action		
	DI4=0 ALARMS	2	If the digital input switches to 0, an alarm is given.		
	DI4=0 FAULTS	3	If the digital input switches to 0, the master control program trips on a fault.		
30.03	DI5 EXT EVENT		Selects how the master control program reacts to the “0” state of digital input DI5.	NO	I
	NO	1	No action		
	DI5=0 ALARMS	2	If the digital input switches to 0, an alarm is given.		
	DI5=0 FAULTS	3	If the digital input switches to 0, the master control program trips on a fault.		
30.04	RESET DELAY [s]		Defines an interval between automatic resets.	60	I
	0…32767 s	1 = 1 s	Automatic reset interval		
30.05	NUMBER OF TRIALS		Defines how many automatic resets are attempted. 0 = Automatic reset disabled.	0	I
	0…32767	1 = 1	Number of automatic resets		
30.06	CURRENT DEV FUNC		Selects the fault function for a detected current deviation.	NO	I
	NO	0	No specific fault function. Detected current deviation can be seen only in status words.		
	ALARM	1	Inverter generates alarm BX CUR DEV if a current deviation is detected (X means the number of the communication channel). Detected deviation can be also seen in status words.		
30.07	CURRENT DEV DELAY		Defines a time delay for the BX CUR DEV alarm. Current deviation must be present longer than this delay before the alarm is generated.	600 s	R
	0.5…419430 s	10 = 1 s	Time delay for the BX CUR DEV alarm		

No.	Name/Value	FbEq	Description	Def	T
30.08	SBOX LOST FUNC		Selects the fault function for a Modbus link lost.	NO	I
	NO	0	No specific fault function. Status of the Modbus link can be seen only in status words.		
	ALARM	1	Inverter generates alarm SBOX X LINK if a Modbus link is broken (X in the middle means the number of the communication channel). Status of the link can also be seen in status words.		
30.09	SBOX LOST DELAY		Defines a time delay for the SBOX X LINK alarm. Link lost situation must be present longer than this delay before the alarm is generated.	60 s	R
	0.5…419430 s	10 = 1 s	Time delay for the SBOX X LINK alarm		
30.10	EM STOP FUNCTION		Selects how the master control program indicates an open emergency stop circuit. Status of the emergency stop circuit is read from digital input 6.	ALARM	I
	NO	0	No alarm indication		
	ALARM	1	Alarm *EM STOP (F081)* is created. Alarm is active if: • Status of digital input 6 (DI6) = 0 • 20-second power-up-delay has elapsed • 30.10 EM STOP FUNCTION = ALARM		
30.11	AUTO RESET MASK	1 = 1	Defines a mask for excluding certain faults from the automatic fault reset function. All other faults are reset by the automatic fault reset function if it is enabled. Bit value 1 means that the fault is reset by the automatic fault reset function and 0 means that the fault is not reset by automatic fault reset function. Bit 0: External grid monitoring fault (from the grid monitoring relay) Bit 1: Insulation resistance fault	0x03	PB
31 PVA CONTROL			Various master control program settings		
31.01	ENABLE MPPT		Enables/disables the operation of the PVS800. 0 = Force state of PVS800 to STAND BY. See also section *PVS800 state machine* on page *30*.	C.00001	P
	-255.255.31 … +255.255.31 / C. -32768 … C. 32767		Parameter pointer or a constant value: • Parameter pointer: Inversion, group, index and bit fields. Bit number is effective only for blocks handling Boolean inputs. • Constant value: Inversion and constant fields. Inversion field must have value C to enable the constant setting.		
31.03	UDC MAX SCALE		Defines the DC voltage that corresponds to the DC measurement source signal value of 20000.	1200 V	R
	0…2000 V	1 = 1 V	Value		
31.04	UDC START LIM		Defines a start limit for the inverter. When the DC voltage exceeds this limit (and the master control program is started), the inverter is started.	600 V	R
	450…2000 V	1 = 1 V	Start DC limit		
31.05	UDC START DLY		Defines a delay for parameter *31.04 UDC START LIM*; the DC voltage must stay above the start limit for longer than the delay before the inverter is started.	10 min	R
	0.0…10000.0 min	1 = 1 min	Delay for start DC limit		

No.	Name/Value	FbEq	Description	Def	T
31.06	UDC STOP LIM		Defines a sleep limit for the inverter. When the DC voltage falls below this limit, the inverter is stopped. If parameter *31.22 UDC STOP LIM AUTO* = ENABLED, the value of this parameter is automatically updated based on the measured grid voltage.	450 V	R
	0…2000 V	1 = 1 V	Stop DC limit		
31.07	UDC STOP DLY		Defines a delay for parameter *31.06 UDC STOP LIM*; the DC voltage must stay below the sleep limit for longer than the delay before the inverter is stopped.	30 min	R
	0.0…10000.0 min	1 = 1 min	Value		
31.09	POWER SOURCE		Defines the signal source that is used by the master control program state machine to determine output power. Default setting is the power measured by, and received from, the inverter unit (parameter *01.11 AC POWER*).	+.001.01 1.00	P
	-255.255.31 … +255.255.31 / C. -32768 … C. 32767		Parameter pointer or a constant value: • Parameter pointer: Inversion, group, index and bit fields. Bit number is effective only for blocks handling Boolean inputs. • Constant value: Inversion and constant fields. Inversion field must have value C to enable the constant setting.		
31.10	POWER STOP LIM		Defines a stop limit for the inverter unit. When the output power falls below this limit, the inverter unit is stopped. Value of 10000 corresponds to the nominal power of the inverter unit.	300	I
	0…20000	1 = 1	Output power stop limit		
31.11	POWER STOP DLY		Defines a delay for parameter *31.10 POWER STOP LIM*; the output power must stay below the stop limit for longer than the delay before the inverter unit is stopped.	30 min	R
	0.0…10000.0 min	1 = 1 min	Output power stop delay		
31.12	GOTO SLEEP MODE		Defines which conditions must be true for the master control program to enter the sleep mode.	UDC OR POW	I
	UDC AND POW	1	PVS800 will enter the sleep mode when both the DC voltage and output power are under their respective stop limits (and remain there until any stop delays elapse).		
	UDC OR POW	2	PVS800 will enter the sleep mode when either the DC voltage or output power is under its respective stop limit (and remains there until the stop delay elapses).		
31.13	WAKE UP SOURCE		Selects a source that can be used to wake up the PVS800. When the value of the monitored source exceeds the limit set by parameter *31.14 WAKE UP START LIM*, and remains there until the delay set by *31.15 WAKE UP START DLY* elapses, the inverter unit is started (provided that the conditions for the DC voltage, defined by other parameters in this group, are fulfilled). If no wake-up source is needed, leave parameters *31.13*…*31.15* at their default (zero) settings.	+.000.00 0.00	P
	-255.255.31 … +255.255.31 / C. -32768 … C. 32767		Parameter pointer or a constant value: • Parameter pointer: Inversion, group, index and bit fields. Bit number is effective only for blocks handling Boolean inputs. • Constant value: Inversion and constant fields. Inversion field must have value C to enable the constant setting.		
31.14	WAKE UP START LIM		Defines a wake-up limit for the signal selected by parameter *31.13 WAKE UP SOURCE*.	0	I
	0…20000	1 = 1	Wake-up limit		

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>Def</th><th>T</th></tr>
<tr><td>31.15</td><td>WAKE UP START DLY</td><td></td><td>Defines a wake-up delay for parameter 31.13 WAKE UP SOURCE.</td><td>0 min</td><td>R</td></tr>
<tr><td></td><td>0.0…10000.0 min</td><td>1 = 1</td><td>Wake-up start delay</td><td></td><td></td></tr>
<tr><td>31.16</td><td>POWER LIMITING</td><td></td><td>Defines a limit for output power of the PVS800 in percent of the nominal power of the inverter unit.
If the value of parameter 31.16 POWER LIMITING is smaller than the value of parameter 31.10 POWER STOP LIM, the inverter goes to the sleep mode.</td><td>200%</td><td>R</td></tr>
<tr><td></td><td>0…200%</td><td>100 = 1%</td><td>Output power limit</td><td></td><td></td></tr>
<tr><td>31.17</td><td>CELL TEMP COEFF</td><td></td><td>Parameters 31.17…31.19 define a photovoltaic cell temperature correction that is applied to the DC voltage start level.
Defines a temperature coefficient for the open-loop solar cell voltage. If set to zero, no temperature correction is applied.
Coefficient must be given for a complete photovoltaic string.</td><td>0 V/K</td><td>R</td></tr>
<tr><td></td><td>-5…0 V/K</td><td>100 = 1 V/K</td><td>Cell temperature coefficient</td><td></td><td></td></tr>
<tr><td>31.18</td><td>CELL TEMP COR LIM</td><td></td><td>Limit for the effect of the temperature correction function.
Base value for the DC voltage start level is read from parameter 31.04 UDC START LIM.</td><td>3%</td><td>R</td></tr>
<tr><td></td><td>0…10%</td><td>100 = 1%</td><td>Temperature correction limit</td><td></td><td></td></tr>
<tr><td>31.19</td><td>CELL TEMP SOURCE</td><td></td><td>Defines a source from which the measured temperature of a photovoltaic cell is read.</td><td>+.001.03 7.00</td><td>P</td></tr>
<tr><td></td><td>-255.255.31 … +255.255.31 /
C. -32768 … C. 32767</td><td></td><td>Parameter pointer or a constant value:
• Parameter pointer: Inversion, group, index and bit fields. Bit number is effective only for blocks handling Boolean inputs.
• Constant value: Inversion and constant fields. Inversion field must have value C to enable the constant setting.</td><td></td><td></td></tr>
<tr><td>31.21</td><td>UDC HIGH DISABLE</td><td>1 = 1</td><td>Defines a mask for disabling the high DC voltage checking in certain situations.
<table>
<tr><th>Bit</th><th>Description</th></tr>
<tr><td>0</td><td>1 = High DC voltage checking is not active when bit 11 in parameter 08.01 MAIN STATUS WORD is set.
0 = High DC voltage checking is active regardless of bit 11 in parameter 08.01 MAIN STATUS WORD.</td></tr>
<tr><td>1</td><td>1= High DC voltage checking is not active when bit 11 in parameter 08.05 PVA STATUS WORD is set.
0 = High DC voltage checking is active regardless of bit 11 in parameter 08.05 PVA STATUS WORD.</td></tr>
<tr><td>2</td><td>1 = High DC voltage checking is not active when bit 9 in 08.08 LIMIT WORD is set.
0 = High DC voltage checking is active regardless of bit 9 in 08.08 LIMIT WORD.</td></tr>
</table></td><td>0x03</td><td>PB</td></tr>
</table>

No.	Name/Value	FbEq	Description	Def	T
31.22	UDC STOP LIM AUTO		Enables or disables the automatic update of parameter *31.06 UDC STOP LIM*. If enabled, *31.06 UDC STOP LIM* = *02.03 MAINS VOLTAGE* x sqrt(2) + 15 V. *31.06 UDC STOP LIM* is updated automatically if the following conditions are met: - 31.22 UDC STOP LIM AUTO = ENABLED - 200 V < *02.03 MAINS VOLTAGE* < 450 V - Bit 11 (LEVEL1_DIP_STA) is clear in parameter *08.01 MAIN STATUS WORD*.	EN-ABLED	
	DISABLED	0	*31.06 UDC STOP LIM* is not updated automatically based on the mains voltage level.		
	ENABLED	1	*31.06 UDC STOP LIM* is updated automatically based on the mains voltage level.		
32 STRING BOX ADDR			Addresses for junction box communication channels. **Note:** Parameter group 32 STRING BOX ADDR is not visible if parameter *33.01ENABLE MONITORING* = FALSE.		
32.01	NR OF BOXES		Shows the number of the junction boxes configured.	0	I
	0…20	1 = 1	Number of the junction boxes configured		
32.03	BOX1 NODE ADDR		Defines the address for junction box communication channel 1. Zero address means that the communication channel is not configured and, thus, not used.	0	I
	0…247	1 = 1	Address for communication channel 1		
32.04	BOX2 NODE ADDR		Defines an address for junction box communication channel 2. Zero address means that the communication channel is not configured and, thus, not used.	0	I
	0…247	1 = 1	Address for communication channel 2		
…	…	…	…	…	…
32.22	BOX20 NODE ADDR		Defines an address for junction box communication channel 20. Zero address means that the communication channel is not configured and, thus, not used.	0	I
	0…247	1 = 1	Address for communication channel 20		
33 STRING MON SET			Settings for string monitoring		
33.01	ENABLE MONITORING		Enables communication for string monitoring. • If the communication is enabled, the master control unit cyclically polls the configured junction boxes. • If the communication is disabled, the master control unit does not communicate with the junction boxes.	FALSE	B
	FALSE	0	String monitoring is disabled.		
	TRUE	1	String monitoring is enabled.		
33.02	CUR DEV CALC ENA		Enables current deviation calculation. String monitoring (see parameter *33.01*) must be enabled to receive the measured currents from the junction boxes.	FALSE	B
	FALSE	0	Current deviation calculation is disabled.		
	TRUE	1	Current deviation calculation is enabled.		

No.	Name/Value	FbEq	Description	Def	T
33.03	MIN CUR DEVIATION		Defines the minimum current deviation for a status indication. If the difference between an average string current and a single string current is bigger than this setting, a deviation is noticed and the corresponding bit in parameters *36.01 BOX1 CUR DEV STA*…*36.20 BOX20 CUR DEV STA* is set. Average string current is calculated separately in each junction box from all enabled strings.	1 A	R
	0…1000 A	1000 = 1 A	Minimum current deviation for a status indication		
33.04	MB MASTER CYCLE		Defines the time between two master requests (polls) in cyclical communication. Time to poll all the configured junction boxes is then (*33.04 MB MASTER CYCLE*) x (*32.01 NR OF BOXES*).	1 s	R
	0.2…1000 s	100 = 1 s	Modbus master cycle time		
33.05	MB MASTER TIMEOUT		Defines a time-out for Modbus master requests. If the response for the master's request is not received within this time, the communication link is considered broken. Time-out counting is started when the request is sent from the Modbus master to the junction box.	0.3 s	R
	0.2…1000 s	100 = 1 s	Modbus master time-out		
33.06	MODBUS MODE		Selects the Modbus mode (master or slave) for the RMBA-01 module installed into RMIO slot 2. If the string monitoring function is used, this parameter must be set to MASTER.	SLAVE	
	SLAVE	0	RMBA-01 is used in the slave mode.		
	MASTER	1	RMBA-01 is used in the master mode.		
33.07	ACYC REQUEST MODE		Selects the type of the acyclical request. When the request is sent, it is either a read request or a write request. Only one register value is read or written within the request.	READ VALUE	B
	READ VALUE	0	Read request will be sent to the junction box.		
	WRITE VALUE	1	Write request will be sent to the junction box.		
33.08	REQUEST NODE ADDR		Defines the station address where the acyclical request is sent.	0	I
	0…247	1 = 1	Station address in the request. Address of 0 means a broadcast message; it should be used only in the write mode.		
33.09	REQUEST REG ADDR		Defines the register address to be read or to be written. Writing a value to this parameter triggers sending of the acyclical request.	0	I
	1…9999	1 = 1	Register address		
33.10	ACYCLIC DATA		Defines or shows the data in acyclical communication. This parameter has three purposes: • If parameter *33.07 ACYC REQUEST MODE* is set to WRITE VALUE, this parameter defines the data that is written to a junction box register. • If parameter *33.07 ACYC REQUEST MODE* is set to READ VALUE, this parameter shows the data that is read from a junction box register. • If the Modbus master receives an error response, this parameter shows the exception code in the error response.	0	
	-32768…32767	1 = 1	Data in acyclical communication		

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>Def</th><th>T</th></tr>
<tr><td colspan="3">34 STRING MON STAT</td><td>Status words for string monitoring</td><td></td><td></td></tr>
<tr><td>34.01</td><td>LINK STATUS 1-16</td><td></td><td>Shows the Modbus link status for communication channels 1…16.
<table>
<tr><th>Bit</th><th>Value</th><th>Information</th></tr>
<tr><td>0…15</td><td>1</td><td>Link is OK; Modbus master is communicating with the junction box.</td></tr>
<tr><td></td><td>0</td><td>Link is broken; Modbus master cannot communicate with the junction box. Either the communication channel is not configured in parameter group 32 or there is a communication break.</td></tr>
</table>
Bit 0 is for the 1st communication channel, bit 1 is for the 2nd communication channel … and bit 15 is for the 16th communication channel.</td><td>0</td><td>PB</td></tr>
<tr><td></td><td>0…65535</td><td>1 = 1</td><td></td><td></td><td></td></tr>
<tr><td>34.02</td><td>LINK STATUS 17-20</td><td></td><td>Shows the Modbus link status for communication channels 17…20.
<table>
<tr><th>Bit</th><th>Value</th><th>Information</th></tr>
<tr><td>0…3</td><td>1</td><td>Link is OK; Modbus master is communicating with the junction box.</td></tr>
<tr><td></td><td>0</td><td>Link is broken; Modbus master cannot communicate with the junction box. Either the communication channel is not configured in parameter group 32 or there is a communication break.</td></tr>
</table>
Bit 0 is for the 17th communication channel, bit 1 is for the 18th communication channel … and bit 3 is for the 20th communication channel.</td><td>0</td><td>PB</td></tr>
<tr><td></td><td>0…15</td><td>1 = 1</td><td></td><td></td><td></td></tr>
<tr><td>34.03</td><td>MONITORING STATUS</td><td></td><td>Status word for string monitoring:
<table>
<tr><th>Bit</th><th>Value</th><th>Information</th></tr>
<tr><td>0</td><td>1</td><td>String monitoring is enabled.</td></tr>
<tr><td></td><td>0</td><td>String monitoring is disabled.</td></tr>
<tr><td>1</td><td>1</td><td>Current deviation calculation is enabled.</td></tr>
<tr><td></td><td>0</td><td>Current deviation calculation is disabled.</td></tr>
<tr><td>2</td><td>1</td><td>RMBA-01 is in the master mode.</td></tr>
<tr><td></td><td>0</td><td>RMBA-01 is in the slave mode.</td></tr>
<tr><td>3</td><td>1</td><td>Write mode is selected for acyclical communication.</td></tr>
<tr><td></td><td>0</td><td>Read mode is selected for acyclical communication.</td></tr>
</table></td><td>0</td><td></td></tr>
<tr><td></td><td>0…15</td><td>1 = 1</td><td></td><td></td><td></td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>Def</th><th>T</th></tr>
<tr><td>34.04</td><td>ACYC REQUEST STAT</td><td></td><td>Status word for acyclical communication.
Status word during a successful acyclical request:
0x0001 (request sending is triggered)
-> 0x0002 (request is sent)
-> 0x0000 (a successful response).
Bits 0, 2 and 3 are cleared when a request is sent. Bit 1 is cleared when an OK response is detected. Successful acyclical communication can be tested by comparing the request status word against a zero value.
<table>
<tr><th>Bit</th><th>Value</th><th>Information</th></tr>
<tr><td>0</td><td>1</td><td>Request sending is triggered; the request will be sent when the communication bus is idle.</td></tr>
<tr><td></td><td>0</td><td>No messages are waiting for to be sent.</td></tr>
<tr><td>1</td><td>1</td><td>Request is sent; the master is waiting for a response.</td></tr>
<tr><td></td><td>0</td><td>Request processing is not active.</td></tr>
<tr><td>2</td><td>1</td><td>Time-out counter has expired (no response from the junction box).</td></tr>
<tr><td></td><td>0</td><td>Time-out counter has not expired.</td></tr>
<tr><td>3</td><td>1</td><td>There was an exception code in the response from a junction box. Code is shown in parameter 33.10.</td></tr>
<tr><td></td><td>0</td><td>Response message from a junction box was successful (no exception code).</td></tr>
<tr><td>4</td><td>1</td><td>Input data in parameter 33.08 or 33.09 is invalid. Acyclical request is not sent.</td></tr>
<tr><td></td><td>0</td><td>Input data in parameters 33.08 and 33.09 was valid when the message sending process was triggered.</td></tr>
</table></td><td>0</td><td></td></tr>
<tr><td></td><td>0…31</td><td>1 = 1</td><td></td><td></td><td></td></tr>
<tr><td>34.05</td><td>MB OK MSG CNT</td><td></td><td>Shows the number of OK messages received by the Modbus master since the last power-up.</td><td>0</td><td>PB</td></tr>
<tr><td></td><td>0…65535</td><td>1 = 1</td><td></td><td></td><td></td></tr>
<tr><td>34.06</td><td>MB ERR MSG CNT</td><td></td><td>Shows the number of error messages received by the Modbus master since the last power-up.</td><td>0</td><td>PB</td></tr>
<tr><td></td><td>0…65535</td><td>1 = 1</td><td></td><td></td><td></td></tr>
<tr><td>34.07</td><td>MB TIMEOUT CNT</td><td></td><td>Shows the number of the Modbus master requests that have ended to a time-out since the last power-up.</td><td>0</td><td>PB</td></tr>
<tr><td></td><td>0…65535</td><td>1 = 1</td><td></td><td></td><td></td></tr>
<tr><td>34.08</td><td>CUR DEV STA 1-16</td><td></td><td>Shows the current deviation status word for junction box communication channels 1…16.
<table>
<tr><th>Bit</th><th>Value</th><th>Information</th></tr>
<tr><td>0…15</td><td>1</td><td>Current deviation is detected.</td></tr>
<tr><td></td><td>0</td><td>Current deviation is not detected.</td></tr>
</table>
Bit 0 is for the 1st communication channel, bit 1 is for the 2nd communication channel … and bit 15 is for the 16th communication channel.</td><td>0</td><td>PB</td></tr>
<tr><td></td><td>0…65535</td><td>1 = 1</td><td></td><td></td><td></td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>Def</th><th>T</th></tr>
<tr><td>34.09</td><td>CUR DEV STA 17-20</td><td></td><td>Shows the current deviation status word for junction box communication channels 17…20.<table><tr><th>Bit</th><th>Value</th><th>Information</th></tr><tr><td>0…3</td><td>1</td><td>Current deviation is detected.</td></tr><tr><td></td><td>0</td><td>Current deviation is not detected.</td></tr></table>Bit 0 is for the 17th communication channel, bit 1 is for the 18th communication channel … and bit 3 is for the 20th communication channel.</td><td>0</td><td>PB</td></tr>
<tr><td></td><td>0…15</td><td>1 = 1</td><td></td><td></td><td></td></tr>
<tr><td colspan="3">35 ENABLED STRINGS</td><td>Strings that are part of current monitoring.
Note: Parameter group 35 ENABLED STRINGS is not visible if parameter 33.01ENABLE MONITORING = FALSE.</td><td></td><td></td></tr>
<tr><td>35.01</td><td>BOX1 STRING ENA</td><td></td><td>Defines which strings are enabled in junction box 1. One bit corresponds to one string in junction box channel 1.<table><tr><th>Bit</th><th>Value</th><th>Information</th></tr><tr><td>0…7</td><td>1</td><td>String channel is enabled in string monitoring and current deviation calculation.</td></tr><tr><td></td><td>0</td><td>String channel is disabled in string monitoring and current deviation calculation.</td></tr></table>Bit 0 is for the 1st string, bit 1 is for the 2nd string … and bit 7 is for the 8th string.</td><td>65535 = 0xFFFF</td><td>PB</td></tr>
<tr><td></td><td>0…255</td><td>1 = 1</td><td>Enabled strings in decimal format</td><td></td><td></td></tr>
<tr><td>35.02</td><td>BOX2 STRING ENA</td><td></td><td>Defines which strings are enabled in junction box 2. One bit corresponds to one string in junction box channel 2.<table><tr><th>Bit</th><th>Value</th><th>Information</th></tr><tr><td>0…7</td><td>1</td><td>String channel is enabled in string monitoring and current deviation calculation.</td></tr><tr><td></td><td>0</td><td>String channel is disabled in string monitoring and current deviation calculation.</td></tr></table>Bit 0 is for the 1st string, bit 1 is for the 2nd string … and bit 7 is for the 8th string.</td><td>65535 = 0xFFFF</td><td>PB</td></tr>
<tr><td></td><td>0…255</td><td>1 = 1</td><td>Enabled strings in decimal format</td><td></td><td></td></tr>
<tr><td>…</td><td>…</td><td>…</td><td>…</td><td>…</td><td>…</td></tr>
<tr><td>35.20</td><td>BOX20 STRING ENA</td><td></td><td>Defines which strings are enabled in junction box 20. One bit corresponds to one string in junction box channel 20.<table><tr><th>Bit</th><th>Value</th><th>Information</th></tr><tr><td>0…7</td><td>1</td><td>String channel is enabled in string monitoring and current deviation calculation.</td></tr><tr><td></td><td>0</td><td>String channel is disabled in string monitoring and current deviation calculation.</td></tr></table>Bit 0 is for the 1st string, bit 1 is for the 2nd string … and bit 7 is for the 8th string.</td><td>65535 = 0xFFFF</td><td>PB</td></tr>
<tr><td></td><td>0…255</td><td>1 = 1</td><td>Enabled strings in decimal format</td><td></td><td></td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>Def</th><th>T</th></tr>
<tr><td colspan="3">36 SBOX CUR DEV STA</td><td>String current deviation status information.
Note: Parameter group 36 SBOX CUR DEV STA is not visible if parameter 33.01ENABLE MONITORING = FALSE.</td><td></td><td></td></tr>
<tr><td>36.01</td><td>BOX1 CUR DEV STA</td><td></td><td>Shows the status of string current deviations in junction box communication channel 1.
<table><tr><th>Bit</th><th>Value</th><th>Information</th></tr><tr><td>0…7</td><td>1</td><td>Current deviation is detected.</td></tr><tr><td></td><td>0</td><td>Current deviation is not detected.</td></tr></table>Bit 0 is for the 1st string, bit 1 is for the 2nd string … and bit 7 is for the 8th string.</td><td>0</td><td>PB</td></tr>
<tr><td></td><td>0…255</td><td>1 =1</td><td></td><td></td><td></td></tr>
<tr><td>36.02</td><td>BOX2 CUR DEV STA</td><td></td><td>Shows the status of string current deviations in junction box communication channel 2.
<table><tr><th>Bit</th><th>Value</th><th>Information</th></tr><tr><td>0…7</td><td>1</td><td>Current deviation is detected.</td></tr><tr><td></td><td>0</td><td>Current deviation is not detected.</td></tr></table>Bit 0 is for the 1st string, bit 1 is for the 2nd string … and bit 7 is for the 8th string.</td><td>0</td><td>PB</td></tr>
<tr><td></td><td>0…255</td><td>1 = 1</td><td></td><td></td><td></td></tr>
<tr><td>…</td><td>…</td><td>…</td><td>…</td><td>…</td><td>…</td></tr>
<tr><td>36.20</td><td>BOX20 CUR DEV STA</td><td></td><td>Shows the status of string current deviations in junction box communication channel 20.
<table><tr><th>Bit</th><th>Value</th><th>Information</th></tr><tr><td>0…7</td><td>1</td><td>Current deviation is detected.</td></tr><tr><td></td><td>0</td><td>Current deviation is not detected.</td></tr></table>Bit 0 is for the 1st string, bit 1 is for the 2nd string … and bit 7 is for the 8th string.</td><td>0</td><td>PB</td></tr>
<tr><td></td><td>0…255</td><td>1 = 1</td><td></td><td></td><td></td></tr>
<tr><td colspan="3">40 STRING BOX 1 & 2</td><td>Actual signals read from communication channels 1 and 2 (ie, junction boxes 1 and 2) using cyclical communication. Signals 40.01…40.27 are for junction box 1 and signals 40.36…40.62 are for junction box 2.
Note: Parameter group 40 STRING BOX 1 & 2 is not visible if parameter 33.01ENABLE MONITORING = FALSE.</td><td></td><td></td></tr>
<tr><td>40.01</td><td>BOX1 TYPE</td><td>1 = 1</td><td>Shows the junction box type (example: 0x040B).</td><td>0</td><td>PB</td></tr>
<tr><td>40.02</td><td>BOX1 SW VERSION</td><td>1 = 1</td><td>Shows the software version (example: 0x102A).</td><td>0</td><td>PB</td></tr>
<tr><td>40.03</td><td>BOX1 HW VERSION</td><td>1 = 1</td><td>Shows the hardware version (example: 0x0102).</td><td>0</td><td>PB</td></tr>
<tr><td>40.04</td><td>BOX1 NR OF CHAN</td><td>1 = 1</td><td>Shows the number of the current measurement channels.</td><td>0</td><td>I</td></tr>
<tr><td>40.05</td><td>BOX1 RESERVED D5</td><td>1 = 1</td><td>Shows the status of the string monitoring unit.
<table><tr><td>0x0001</td><td>Normal mode, initialization</td></tr><tr><td>0x0002</td><td>Normal mode, running</td></tr><tr><td>0x0003</td><td>Normal mode, error</td></tr><tr><td>0x0100</td><td>Calibration mode, initialization</td></tr><tr><td>0x0200</td><td>Calibration mode, running</td></tr><tr><td>0x0300</td><td>Calibration mode, error</td></tr><tr><td>0x0400</td><td>Calibration mode has ended</td></tr></table></td><td>0</td><td>I</td></tr>
<tr><td>40.06</td><td>BOX1 RESERVED D6</td><td>1 = 1</td><td>Reserved</td><td>0</td><td>I</td></tr>
</table>

No.	Name/Value	FbEq	Description	Def	T
40.07	BOX1 OK MSG CNT	1 = 1	Shows the number of OK messages.	0	PB
40.08	BOX1 ER MSG CNT	1 = 1	Shows the number of error messages.	0	PB
40.09	BOX1 BOARD TEMP	10 = 1°C	Shows the temperature of the string monitoring unit.	0	R
40.10	ANALOG INPUT 1	50 = 1 mA or 100 = 1 V	Shows the measured current/voltage in analog input 1.	0	I
40.11	ANALOG INPUT 2	2 = 1 mV	Shows the measured current/voltage in analog input 2.	0	I
40.12	PT100 TEMP A	10 = 1°C	Shows the measured temperature in Pt100 channel A.	0	I
40.13	PT100 TEMP B	10 = 1°C	Shows the measured temperature in Pt100 channel B.	0	I
40.14	RESERVED D14		Reserved	0	
40.15	DI STATUS WORD	1 = 1	Shows the status of the digital inputs. Bit 1: Status of digital input 1 Bit 2: Status of digital input 2 Bit 3: Status of digital input 3	0	PB
40.16	RESERVED D16		Reserved		
40.17	RESERVED D17		Reserved		
40.18	RESERVED D18		Reserved		
40.19	RESERVED D19		Reserved		
40.20	STRING 1 AVG CUR	1000 = 1 A	Shows the average current of string 1.	0	R
40.21	STRING 2 AVG CUR	1000 = 1 A	Shows the average current of string 2.	0	R
…	…	…	…	…	…
40.35	STRING 16 AVG CUR	1000 = 1 A	Shows the average current of string 16.	0	R
40.36	BOX2 TYPE	1 = 1	Shows the junction box type (example: 0x040B).	0	PB
40.37	BOX2 SW VERSION	1 = 1	Shows the software version (example: 0x102A).	0	PB
40.38	BOX2 HW VERSION	1 = 1	Shows the hardware version (example: 0x0102).	0	PB
40.39	BOX2 NR OF CHAN	1 = 1	Shows the number of the current measurement channels.	0	I
40.40	BOX2 RESERVED D5	1 = 1	Shows the status of the string monitoring unit. 0x0001: Normal mode, initialization 0x0002: Normal mode, running 0x0003: Normal mode, error 0x0100: Calibration mode, initialization 0x0200: Calibration mode, running 0x0300: Calibration mode, error 0x0400: Calibration mode has ended		
40.41	BOX2 RESERVED D6		Reserved		
40.42	BOX2 OK MSG CNT	1 = 1	Shows the number of OK messages.	0	PB
40.43	BOX2 ER MSG CNT	1 = 1	Shows the number of error messages.	0	PB
40.44	BOX2 BOARD TEMP	10 = 1°C	Shows the temperature of the string monitoring unit.	0	R

No.	Name/Value	FbEq	Description	Def	T
40.45	ANALOG INPUT 1	50 = 1 mA or 100 = 1 V	Shows the measured current/voltage in analog input 1.	0	I
40.46	ANALOG INPUT 2	2 = 1 mV	Shows the measured current/voltage in analog input 2.	0	I
40.47	PT100 TEMP A	10 = 1°C	Shows the measured temperature in Pt100 channel A.	0	I
40.48	PT100 TEMP B	10 = 1°C	Shows the measured temperature in Pt100 channel B.	0	I
40.49	RESERVED D14		Reserved		
40.50	DI STATUS WORD	1 = 1	Shows the status of the digital inputs. Bit 1 – Status of digital input 1 Bit 2 – Status of digital input 2 Bit 3 – Status of digital input 3	0	PB
40.51	RESERVED D16				
40.52	RESERVED D17				
40.53	RESERVED D18				
40.54	RESERVED D19				
40.55	STRING 1 AVG CUR	1000 = 1 A	Shows the average current of string 1.	0	R
40.56	STRING 2 AVG CUR	1000 = 1 A	Shows the average current of string 2.	0	R
…	…	…	…	…	…
40.70	STRING 16 AVG CUR	1000 = 1 A	Shows the average current of string 16.	0	R
41 STRING BOX 3 & 4			Actual signals read from communication channels 3 and 4 (ie, junction boxes 3 and 4) using cyclical communication. Signals 41.01…41.27 are for junction box 3 and signals 41.36…41.62 are for junction box 4. **Note:** Parameter group 41 STRING BOX 3 & 4 is not visible if parameter *33.01ENABLE MONITORING* = FALSE.		
			See group *40 STRING BOX 1 & 2* for the signal descriptions.		
42 STRING BOX 5 & 6			Actual signals read from communication channels 5 and 6 (ie, junction boxes 5 and 6) using cyclical communication. Signals 42.01…42.27 are for junction box 5 and signals 42.36…42.62 are for junction box 6. **Note:** Parameter group 42 STRING BOX 5 & 6 is not visible if parameter *33.01ENABLE MONITORING* = FALSE.		
			See group *40 STRING BOX 1 & 2* for the signal descriptions.		
43 STRING BOX 7 & 8			Actual signals read from communication channels 7 and 8 (ie, junction boxes 7 and 8) using cyclical communication. Signals 43.01…43.27 are for junction box 7 and signals 43.36…43.62 are for junction box 8. **Note:** Parameter group 43 STRING BOX 7 & 8 is not visible if parameter *33.01ENABLE MONITORING* = FALSE.		
			See group *40 STRING BOX 1 & 2* for the signal descriptions.		

No.	Name/Value	FbEq	Description	Def	T
44 STRING BOX 9 & 10			Actual signals read from communication channels 9 and 10 (ie, junction boxes 9 and 10) using cyclical communication. Signals 44.01…44.27 are for junction box 9 and signals 44.36…44.62 are for junction box 10. **Note:** Parameter group 44 STRING BOX 9 & 10 is not visible if parameter *33.01ENABLE MONITORING* = FALSE.		
			See group *40 STRING BOX 1 & 2* for the signal descriptions.		
45 STRING BOX 11 & 12			Actual signals read from communication channels 11 and 12 (ie, junction boxes 11 and 12) using cyclical communication. Signals 45.01…45.27 are for junction box 11 and signals 45.36…45.62 are for junction box 12. **Note:** Parameter group 45 STRING BOX 11 & 12 is not visible if parameter *33.01ENABLE MONITORING* = FALSE.		
			See group *40 STRING BOX 1 & 2* for the signal descriptions.		
46 STRING BOX 13 & 14			Actual signals read from communication channels 13 and 14 (ie, junction boxes 13 and 14) using cyclical communication. Signals 46.01…46.27 are for junction box 13 and signals 46.36…46.62 are for junction box 14. **Note:** Parameter group 46 STRING BOX 13 & 14 is not visible if parameter *33.01ENABLE MONITORING* = FALSE.		
			See group *40 STRING BOX 1 & 2* for the signal descriptions.		
47 STRING BOX 15 & 16			Actual signals read from communication channels 15 and 16 (ie, junction boxes 15 and 16) using cyclical communication. Signals 47.01…47.27 are for junction box 15 and signals 47.36…47.62 are for junction box 16. **Note:** Parameter group 47 STRING BOX 15 & 16 is not visible if parameter *33.01ENABLE MONITORING* = FALSE.		
			See group *40 STRING BOX 1 & 2* for the signal descriptions.		
48 STRING BOX 17 & 18			Actual signals read from communication channels 17 and 18 (ie, junction boxes 17 and 18) using cyclical communication. Signals 48.01…48.27 are for junction box 17 and signals 48.36…48.62 are for junction box 18. **Note:** Parameter group 48 STRING BOX 17 & 18 is not visible if parameter *33.01ENABLE MONITORING* = FALSE.		
			See group *40 STRING BOX 1 & 2* for the signal descriptions.		
49 STRING BOX 19 & 20			Actual signals read from communication channels 19 and 20 (ie, junction boxes 19 and 20) using cyclical communication. Signals 49.01…49.27 are for junction box 19 and signals 49.36…49.62 are for junction box 20. **Note:** Parameter group 49 STRING BOX 19 & 20 is not visible if parameter *33.01ENABLE MONITORING* = FALSE.		
			See group *40 STRING BOX 1 & 2* for the signal descriptions.		
50 MASTER ADAPTER N			These parameters are visible and need to be adjusted only when an Nxxx type fieldbus adapter module (optional) is installed. For details on the parameters, refer to the manual of the adapter module. **Note:** Any changes in these parameters take effect only after the next power-up of the adapter module.		
50.01	MODULE N TYPE		Module type and software version. NOT DEFINED = No module present.		
50.02 … 50.99	-		According to the module type		

No.	Name/Value	FbEq	Description	Def	T
51 MASTER ADAPTER			These parameters are visible and need to be adjusted only when a Rxxx type fieldbus adapter module (optional) is installed. For details on the parameters, refer to the manual of the adapter module. **Note:** Any changes in these parameters take effect only after the next power-up of the adapter module.		
51.01	MODULE TYPE		Module type and software version. NOT DEFINED = No module present.		
51.02 … 51.99	-		According to the module type		
52 STANDARD MODBUS			Settings for Standard Modbus Link. See chapter *Fieldbus control*. See also *RMBA-01 Modbus Adapter User's Manual* (3AFE64498851 [English]).		
52.01	STATION NUMBER		Defines the address of the device. Two units with the same address are not allowed on-line.	1	I
	1…247		Address		
52.02	BAUDRATE		Defines the transfer rate of the link.	9600	I
	600	1	600 bit/s		
	1200	2	1200 bit/s		
	2400	3	2400 bit/s		
	4800	4	4800 bit/s		
	9600	5	9600 bit/s		
	19200	6	19200 bit/s		
52.03	PARITY		Defines the use of parity and stop bits. Same setting must be used in all on-line stations.	NONE1 STOP-BIT	I
	NONE1STOPBIT	1	No parity bit, one stop bit		
	NONE2STOPBIT	2	No parity bit, two stop bits		
	ODD	3	Odd parity indication bit, one stop bit		
	EVEN	4	Even parity indication bit, one stop bit		
53 USER PARAMETERS			Adaptive programming settings		
53.01	NUMERIC 1		Defines a numeric parameter for adaptive programming.	0	I
	-8388608…8388607		Numeric value		
53.02	NUMERIC 2		Defines a numeric parameter for adaptive programming.	0	I
	-8388608…8388607		Numeric value		
…	…		…	…	…
53.10	NUMERIC 10		Defines a numeric parameter for adaptive programming.	0	I
	-8388608…8388607		Numeric value		
53.11	STRING 1		Defines an alarm or a fault text indication for the EVENT block.	MESSAGE1	C
	0…9 characters		ASCII string type		
53.12	STRING 2		Defines an alarm or a fault text indication for the EVENT block.	MESSAGE2	C
	0…9 characters		ASCII string type		
…	…		…	…	…

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>Def</th><th>T</th></tr>
<tr><td>53.24</td><td>STRING 14</td><td></td><td>Defines an alarm or a fault text indication for the EVENT block.</td><td>MESSAGE14</td><td>C</td></tr>
<tr><td></td><td>0…9 characters</td><td></td><td>ASCII string type</td><td></td><td></td></tr>
<tr><td colspan="3">55 ADAPTIVE PROG1</td><td>Adaptive program task 1 settings:
• selections of the function blocks and their input connections
• diagnostics.
This parameter group is mainly used with adaptive programming. See section Adaptive programming with DriveAP 2.x (page 41) and Application guide: Adaptive program for PVS800 central inverters (3AUA0000091276 [English]).</td><td></td><td></td></tr>
<tr><td>55.01</td><td>STATUS</td><td></td><td>Shows the value of the adaptive program task 1 status word.</td><td>0</td><td>I</td></tr>
<tr><td></td><td>0…15</td><td></td><td>Table below shows the alternative bit states and the corresponding values on the control panel display.
If all the bits are FALSE (ie, 0), the state is STOPPED.
<table>
<tr><th>Bit</th><th>Display</th><th>Meaning</th></tr>
<tr><td>0</td><td>1</td><td>Running</td></tr>
<tr><td>1</td><td>2</td><td>Editing</td></tr>
<tr><td>2</td><td>4</td><td>Checking</td></tr>
<tr><td>3</td><td>8</td><td>Faulted</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>55.02</td><td>FAULTED PAR</td><td></td><td>Points out the faulted parameter in adaptive program task 1.</td><td>0</td><td>P</td></tr>
<tr><td></td><td>-255.255.31 … +255.255.31</td><td></td><td>Parameter pointer: Inversion, group, index and bit fields</td><td></td><td></td></tr>
<tr><td>55.05</td><td>BLOCK1</td><td></td><td>Selects the function block type for block 1 in adaptive program task 1.</td><td>NO</td><td>I</td></tr>
<tr><td></td><td>0…32768</td><td></td><td>Function block type</td><td></td><td></td></tr>
<tr><td>55.06</td><td>INPUT1</td><td></td><td>Selects the source for input 1 of block 1.</td><td>0</td><td>P</td></tr>
<tr><td></td><td>-255.255.31 … +255.255.31 /
C. -32768 … C. 32767</td><td></td><td>Parameter index or a constant value:
• Parameter pointer: Inversion, group, index and bit fields. Bit number is effective only for blocks handling Boolean inputs.
• Constant value: Inversion and constant fields. Inversion field must have value C to enable the constant setting.
Example: The state of digital input DI2 is connected to input 1 as follows:
• Set this parameter to +08.02.02. (The adaptive program stores the state of digital input DI2 to bit 2 of actual signal 08.02.)
• If you need an inverted value, switch the sign of the pointer value (-08.02.02).</td><td></td><td></td></tr>
<tr><td>55.07</td><td>INPUT2</td><td></td><td>Selects the source for input 2 of block 1.</td><td>0</td><td>P</td></tr>
<tr><td></td><td></td><td></td><td>See parameter 55.06 INPUT1.</td><td></td><td></td></tr>
<tr><td>55.08</td><td>INPUT3</td><td></td><td>Selects the source for input 3 of block 1.</td><td>0</td><td>P</td></tr>
<tr><td></td><td></td><td></td><td>See parameter 55.06 INPUT1.</td><td></td><td></td></tr>
<tr><td>55.09</td><td>OUTPUT</td><td></td><td>Stores and displays the output of block 1.</td><td>0</td><td>I</td></tr>
<tr><td></td><td></td><td></td><td>No user setting possible</td><td></td><td></td></tr>
<tr><td>55.10</td><td>BLOCK2</td><td></td><td>Selects the function block type for block 2 in adaptive program task 1.</td><td>NO</td><td>I</td></tr>
<tr><td></td><td>0…32768</td><td></td><td>Function block type</td><td></td><td></td></tr>
<tr><td>55.11</td><td>INPUT1</td><td></td><td>Selects the source for input 1 of block 2.</td><td>0</td><td>P</td></tr>
<tr><td></td><td></td><td></td><td>See parameter 55.06 INPUT1.</td><td></td><td></td></tr>
</table>

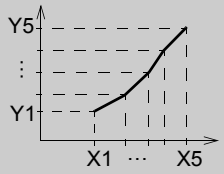
No.	Name/Value	FbEq	Description	Def	T
55.12	INPUT2		Selects the source for input 2 of block 2.	0	P
			See parameter *55.06 INPUT1*.		
55.13	INPUT3		Selects the source for input 3 of block 2.	0	P
			See parameter *55.06 INPUT1*.		
55.14	OUTPUT		Stores and displays the output of block 2.	0	I
			No user setting possible		
55.15	BLOCK3		Selects the function block type for block 3 in adaptive program task 1.	NO	I
	0…32768		Function block type		
…	…		…	…	…
55.54	OUTPUT		Stores and displays the output of block 10.	0	I
			No user setting possible		
56 ADAPT PROG1 CTRL			Adaptive program task 1 control. The update time of task 1 control is 10 ms. This parameter group is mainly used with the DriveAP 2.x PC tool. See parameter group *55 ADAPTIVE PROG1*.		
56.01	ADAPT PROG CMD		Selects the operation mode for adaptive program task 1.	EDIT	I
	STOP	1	Stopped. The program cannot be edited.		
	START	2	Running. The program cannot be edited.		
	EDIT	3	Stops to edit the mode (ie, the execution of the task is stopped for editing). The program can be edited.		
56.02	EDIT CMD		Selects the command for the block placed in the location defined by parameter *56.03 EDIT BLOCK*.	NO	I
	NO	1	Home value. The value automatically reverts to *NO* after an editing command has been executed. The program must be in the edit mode (see parameter *56.01 ADAPT PROG CMD*).		
	PUSH	2	Shifts the block in the location defined by parameter *56.03 EDIT BLOCK* and the subsequent blocks one location up. A new block can be placed in the emptied location. The program must be in the edit mode (see parameter *56.01 ADAPT PROG CMD*).		
	DELETE	3	Selects the block in the location defined by parameter *56.03 EDIT BLOCK* and shifts the subsequent blocks one step down. The program must be in the edit mode (see parameter *56.01 ADAPT PROG CMD*).		
	PROTECT	4	Activation of the task protection: Read protects the input connections of the blocks. Activate as follows: - Ensure the task operation mode is set to *START* or *STOP* (parameter *56.01 ADAPT PROG CMD*). - Set the passcode by parameter *56.05 PASSCODE*. - Set this parameter to *PROTECT*. When protection is activated: - All parameters in group *55 ADAPTIVE PROG1* excluding the block output parameters are hidden (read protected). - It is not possible to switch the task operating mode (parameter *56.01 ADAPT PROG CMD*) to the edit mode. - Parameter *56.05 PASSCODE* is set to 0.		

No.	Name/Value	FbEq	Description	Def	T
	UNPROTECT	5	Deactivation of the task protection: no read protection of the inputs of the blocks. Deactivate as follows: - Ensure the task operation mode is set to *START* or *STOP* (parameter *56.01 ADAPT PROG CMD*). - Set the passcode by parameter *56.05 PASSCODE*. - Set this parameter to *UNPROTECT*.		
56.03	EDIT BLOCK		Defines the block location number for the command selected by parameter *56.02 EDIT CMD*.	0	I
	1…15		Block location number		
56.04	TIMELEV_SEL		Indicates the fixed execution cycle time (10 ms) of adaptive program task 1. Also digital and analog inputs are read on this time level.	10ms	I
56.05	PASSCODE		Defines the passcode, which activates/deactivates the protection of the input connections of the blocks. See parameter *56.02 EDIT CMD*.	0	I
	0 h…FFFFFF h		Passcode. The setting reverts to 0 after the protection is activated/deactivated. **Note:** When you activate the protection, write down the passcode and store it for later use.		
57 ADAPTIVE PROG2			Adaptive program task 2 settings: - selections of the function blocks and their input connections - diagnostics. This parameter group is mainly used with the DriveAP 2.x PC tool. See section *Adaptive programming with DriveAP 2.x* (page *41*) and *Application guide: Adaptive program for PVS800 central inverters* (3AUA0000091276 [English]).		
57.01	STATUS		Shows the value of the adaptive program task 2 status word.	0	I
	0…15		The table below shows the alternative bit states and the corresponding values on the control panel display. If all the bits are FALSE (ie, 0), the state is STOPPED.		
57.02	FAULTED PAR		Points out the faulted parameter in adaptive program task 2.	0	P
	-255.255.31 … +255.255.31		Parameter pointer: Inversion, group, index and bit fields.		
57.05	BLOCK1		Selects the function block type for block 1 in adaptive program task 2.	NO	I
	0…32768		Function block type		

Bit	Display	Meaning
0	1	Running
1	2	Editing
2	4	Checking
3	8	Faulted

No.	Name/Value	FbEq	Description	Def	T
57.06	INPUT1		Selects the source for input 1 of block 1.	0	P
	-255.255.31 … +255.255.31 / C. -32768 … C. 32767		Parameter index or a constant value: • Parameter pointer: Inversion, group, index and bit fields. The bit number is effective only for blocks handling Boolean inputs. • Constant value: Inversion and constant fields. Inversion field must have value C to enable the constant setting. Example: The state of digital input DI2 is connected to input 1 as follows: • Set this parameter to +08.02.02. (The adaptive program stores the state of digital input DI2 to bit 2 of actual signal 08.02.) • If you need an inverted value, switch the sign of the pointer value (-08.02.02).		
57.07	INPUT2		Selects the source for input 2 of block 1.	0	P
			See parameter *57.06 INPUT1*.		
57.08	INPUT3		Selects the source for input 3 of block 1.	0	P
			See parameter *57.06 INPUT1*.		
57.09	OUTPUT		Stores and displays the output of block 1.	0	I
			No user setting possible		
57.10	BLOCK2		Selects the function block type for block 2 in adaptive program task 2.	NO	I
	0…32768		Function block type		
57.11	INPUT1		Selects the source for input 1 of block 2.	0	P
			See parameter *57.06 INPUT1*.		
57.12	INPUT2		Selects the source for input 2 of block 2.	0	P
			See parameter *57.06 INPUT1*.		
57.13	INPUT		Selects the source for input 3 of block 2.	0	P
			See parameter *57.06 INPUT1*.		
57.14	OUTPUT		Stores and displays the output of block 2.	0	I
			No user setting possible		
57.15	BLOCK3		Selects the function block type for block 3 in adaptive program task 2.	NO	I
	0…32768		Function block type		
…	…	…	…	…	…
57.104	OUTPUT		Stores and displays the output of block 20.		I
	0…32768		No user setting possible	0	
58 ADAPT PROG2 CTRL			Adaptive program task 2 control. Update time of task 2 control is 100 ms. This parameter group is mainly used with the DriveAP 2.x PC tool. See parameter group *57 ADAPTIVE PROG2*.		
58.01	ADAPT PROG CMD		Selects the operation mode for adaptive program task 2.	EDIT	I
	STOP	1	Stopped. Program cannot be edited.		
	START	2	Running. Program cannot be edited.		
	EDIT	3	Stops to edit the mode. Program can be edited.		

No.	Name/Value	FbEq	Description	Def	T
58.02	EDIT CMD		Selects the command for the block placed in the location defined by parameter *58.03 EDIT BLOCK*. Program must be in the editing mode (see parameter *58.01 ADAPT PROG CMD*).	NO	I
	NO	1	Home value. Value automatically reverts to *NO* after an editing command has been executed.		
	PUSH	2	Shifts the block in the location defined by parameter *58.03 EDIT BLOCK* and the subsequent blocks one location up. New block can be placed in the emptied location.		
	DELETE	3	Selects the block in the location defined by parameter *58.03 EDIT BLOCK* and shifts the subsequent blocks one step down.		
	PROTECT	4	Activation of the task protection: Read-protects the input connections of the blocks. Activate as follows: - Ensure the task operation mode is set to *START* or *STOP* (parameter *58.01 ADAPT PROG CMD*). - Set the passcode by parameter *58.05 PASSCODE*. - Set parameter *58.02* to *PROTECT*. When protection is activated: - All parameters in group *57 ADAPTIVE PROG2* excluding the block output parameters are hidden (read-protected). - It is not possible to switch the task operating mode (parameter *58.01 ADAPT PROG CMD*) to the editing mode. - Parameter *58.05 PASSCODE* value is set to 0.		
	UNPROTECT	5	Deactivation of the task protection: no read protection of the input connection of the blocks. Deactivate as follows: - Ensure the adaptive task operation mode is set to *START* or *STOP* (parameter *58.01 ADAPT PROG CMD*). - Set the passcode by parameter *58.05 PASSCODE*. - Set parameter *58.02* to *UNPROTECT*.		
58.03	EDIT BLOCK		Defines the block location number for the command selected by parameter *58.02 EDIT CMD*.	0	I
	1…15		Block location number		
58.04	TIMELEV_SEL		Indicates the fixed execution cycle time of 100 ms for adaptive program task 2.	100ms	I
58.05	PASSCODE		Defines the passcode, which activates/deactivates the protection of the input connections of the blocks. See parameter *58.02 EDIT CMD*.	0	I
	0 h…FFFFFF h		Passcode. The setting restores to 0 after the protection is activated/deactivated. **Note:** When you activate the protection, write down the passcode and store it for later use.		

No.	Name/Value	FbEq	Description	Def	T
65 FUNC GENERATOR			Defines a five-point [(x1, y1), (x2, y2), (x3, y3), (x4, y4), (x5, y5)] function curve in the adaptive program. See blocks FUNG IN and FUNG OUT in *Application guide: Adaptive program for PVS800 central inverters* (3AUA0000091276 [English]). Function is executed on 100 ms time level. Function generator can be used, eg, for defining pump acceleration curves. 		
65.01	ENABLE		Activates the function.	OFF	B
	OFF	0	Inactive		
	ON	65535	Active		
65.03	OUT		Defines the output of the function curve.	0	R
	-32768…32767	1 = 1	Value		
65.04	X1		Defines the value for the x-axis 1st point (x1, y1).	0	R
	-32768…32767	1 = 1	Value		
65.05	Y1		Defines the value for the y-axis 1st point (x1, y1).	0	R
	-32768…32767	1 = 1	Value		
65.06	X2		Defines the value for the x-axis 2nd point (x2, y2).	0	R
	-32768…32767	1 = 1	Value		
65.07	Y2		Defines the value for the y-axis 2nd point (x2, y2).	0	R
	-32768…32767	1 = 1	Value		
65.08	X3		Defines the value for the x-axis 3rd point (x3, y3).	0	R
	-32768…32767	1 = 1	Value		
65.09	Y3		Defines the value for the y-axis 3rd point (x3, y3).	0	R
	-32768…32767	1 = 1	Value		
65.10	X4		Defines the value for the x-axis 4th point (x4, y4).	0	R
	-32768…32767	1 = 1	Value		
65.11	Y4		Defines the value for the y-axis 4th point (x4, y4).	0	R
	-32768…32767	1 = 1	Value		
65.12	X5		Defines the value for the x-axis 5th point (x5, y5).	0	R
	-32768…32767	1 = 1	Value		
65.13	Y5		Defines the value for the y-axis 5th point (x5, y5).	0	R
	-32768…32767	1 = 1	Value		

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>Def</th><th>T</th></tr>
<tr><td colspan="3">66 ADAPTIVE CONNECT</td><td>This group consists of input type parameters for the adaptive program. Note: It is recommended that these parameter values be set with the DriveAP 2.x PC tool.
See section Adaptive programming with DriveAP 2.x (page 41) and Application guide: Adaptive program for PVS800 central inverters (3AUA0000091276 [English]).</td><td></td><td></td></tr>
<tr><td>66.01</td><td>CW</td><td>1 = 1</td><td>Defines the input for block CW.
<table>
<tr><th>Bit</th><th>Name</th><th>Value</th><th>Description</th></tr>
<tr><td rowspan="2">0</td><td rowspan="2">ON/OFF</td><td>0 ⇒1</td><td>Start charging (close charging contactors and main breakers)</td></tr>
<tr><td>0</td><td>Open main breakers</td></tr>
<tr><td>1, 2</td><td colspan="3">Reserved</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">START</td><td>1</td><td>Start modulation</td></tr>
<tr><td>0</td><td>Stop modulation</td></tr>
<tr><td>4…6</td><td colspan="3">Reserved</td></tr>
<tr><td>7</td><td>RESET</td><td>0 ⇒1</td><td>Reset</td></tr>
<tr><td>8…15</td><td colspan="3">Reserved</td></tr>
</table>
See also parameter 07.02 USED MCW.</td><td>0</td><td>P</td></tr>
<tr><td></td><td>-255.255.31 … +255.255.31 /
C. -32768 … C. 32767</td><td></td><td>Parameter pointer or a constant value:
• Parameter pointer: Inversion, group, index and bit fields. Bit number is effective only for blocks handling Boolean inputs.
• Constant value: Inversion and constant fields. Inversion field must have value C to enable the constant setting.</td><td></td><td></td></tr>
<tr><td>66.02</td><td>DO1</td><td>1 = 1</td><td>Defines the input for block DO1 which controls relay output RO1 on the control unit.</td><td>0</td><td>P</td></tr>
<tr><td></td><td></td><td></td><td>Signal index or constant value, see parameter 66.01 CW.</td><td></td><td></td></tr>
<tr><td>66.03</td><td>DO2</td><td>1 = 1</td><td>Defines the input for block DO2 which controls relay output RO2 on the control unit.</td><td>-.008.00 1.03</td><td>P</td></tr>
<tr><td></td><td></td><td></td><td>Signal index or constant value, see parameter 66.01 CW.</td><td></td><td></td></tr>
<tr><td>66.04</td><td>DO3</td><td>1 = 1</td><td>Defines the input for block DO3 which controls relay output RO3 on the control unit.</td><td>C.00001</td><td>P</td></tr>
<tr><td></td><td></td><td></td><td>Signal index or constant value, see parameter 66.01 CW.</td><td></td><td></td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>Def</th><th>T</th></tr>
<tr><td>66.05</td><td>EXT DO</td><td>1 = 1</td><td>Defines the input for block EXT DO which controls extension module digital outputs (EXT DO word). Updating interval is 20 ms.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>EXT1 DO1</td><td>Digital output 1 control on RDIO extension module 1</td></tr>
<tr><td>1</td><td>EXT1 DO2</td><td>Digital output 2 control on RDIO extension module 1</td></tr>
<tr><td>2</td><td>EXT2 DO1</td><td>Digital output 1 control on RDIO extension module 2</td></tr>
<tr><td>3</td><td>EXT2 DO2</td><td>Digital output 2 control on RDIO extension module 2</td></tr>
<tr><td>4</td><td>EXT3 DO1</td><td>Digital output 1 control on RDIO extension module 3</td></tr>
<tr><td>5</td><td>EXT3 DO2</td><td>Digital output 2 control on RDIO extension module 3</td></tr>
<tr><td>6</td><td>EXT4 DO1</td><td>Digital output 1 control on RDIO extension module 4</td></tr>
<tr><td>7</td><td>EXT4 DO2</td><td>Digital output 2 control on RDIO extension module 4</td></tr>
<tr><td>8</td><td>EXT5 DO1</td><td>Digital output 1 control on RDIO extension module 5</td></tr>
<tr><td>9</td><td>EXT5 DO2</td><td>Digital output 2 control on RDIO extension module 5</td></tr>
<tr><td>10…15</td><td></td><td>Reserved</td></tr>
</table></td><td>0</td><td>P</td></tr>
<tr><td></td><td></td><td></td><td>Signal index or constant value, see parameter 66.01 CW.</td><td></td><td></td></tr>
<tr><td>66.06</td><td>AO1</td><td>1 = 1</td><td>Defines the input for block AO1 which controls analog output 1 on the control unit.</td><td>0</td><td>P</td></tr>
<tr><td></td><td></td><td></td><td>Signal index or constant value, see parameter 66.01 CW.</td><td></td><td></td></tr>
<tr><td>66.07</td><td>AO2</td><td>1 = 1</td><td>Defines the input for block AO2 which controls analog output 2 on the control unit.</td><td>0</td><td>P</td></tr>
<tr><td></td><td></td><td></td><td>Signal index or constant value, see parameter 66.01 CW.</td><td></td><td></td></tr>
<tr><td>66.08</td><td>EXT1 AO1</td><td>1 = 1</td><td>Defines the input for block EXT1 AO1 which controls analog output 1 of extension module 1.</td><td>0</td><td>P</td></tr>
<tr><td></td><td></td><td></td><td>Signal index or constant value, see parameter 66.01 CW.</td><td></td><td></td></tr>
<tr><td>66.09</td><td>EXT1 AO2</td><td>1 = 1</td><td>Defines the input for block EXT1 AO2 which controls analog output 2 of extension module 1.</td><td>0</td><td>P</td></tr>
<tr><td></td><td></td><td></td><td>Signal index or constant value, see parameter 66.01 CW.</td><td></td><td></td></tr>
<tr><td>66.10</td><td>EXT2 AO1</td><td>1 = 1</td><td>Defines the input for block EXT2 AO1 which controls analog output 1 of extension module 2.</td><td>0</td><td>P</td></tr>
<tr><td></td><td></td><td></td><td>Signal index or constant value, see parameter 66.01 CW.</td><td></td><td></td></tr>
<tr><td>66.11</td><td>EXT2 AO2</td><td>1 = 1</td><td>Defines the input for block EXT2 AO2 which controls analog output 2 of extension module 2.</td><td>0</td><td>P</td></tr>
<tr><td></td><td></td><td></td><td>Signal index or constant value, see parameter 66.01 CW.</td><td></td><td></td></tr>
<tr><td>66.12</td><td>EXT3 AO1</td><td>1 = 1</td><td>Defines the input for block EXT3 AO1 which controls analog output 1 of extension module 3.</td><td>0</td><td>P</td></tr>
<tr><td></td><td></td><td></td><td>Signal index or constant value, see parameter 66.01 CW.</td><td></td><td></td></tr>
<tr><td>66.13</td><td>EXT3 AO2</td><td>1 = 1</td><td>Defines the input for block EXT3 AO2 which controls analog output 2 of extension module 3.</td><td>0</td><td>P</td></tr>
<tr><td></td><td></td><td></td><td>Signal index or constant value, see parameter 66.01 CW.</td><td></td><td></td></tr>
</table>

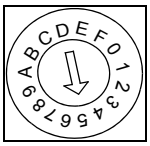
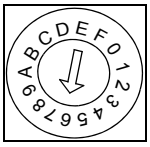
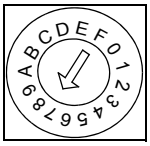
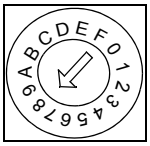
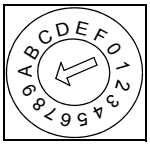
No.	Name/Value	FbEq	Description	Def	T
66.14	EXT4 AO1	1 = 1	Defines the input for block EXT4 AO1 which controls analog output 1 of extension module 4.	0	P
			Signal index or constant value, see parameter *66.01 CW*.		
66.15	EXT4 AO2	1 = 1	Defines the input for block EXT4 AO2 which controls analog output 2 of extension module 4.	0	P
			Signal index or constant value, see parameter *66.01 CW*.		
66.16	EXT5 AO1	1 = 1	Defines the input for block EXT5 AO1 which controls analog output 1 of extension module 5.	0	P
			Signal index or constant value, see parameter *66.01 CW*.		
66.17	EXT5 AO2	1 = 1	Defines the input for block EXT5 AO2 which controls analog output 2 of extension module 5.	0	P
			Signal index or constant value, see parameter *66.01 CW*.		
66.18	FUNC GEN	1 = 1	Defines an input for function generator input. This signal is mainly used with DriveAP PC tool.	0	P
	C -32768 … C 32768		Constant value		
66.19	AP AFW	1 = 1	Defines an alarm and fault word for the adaptive program.	0	P
			Signal index or constant value, see parameter *66.01 CW*.		
70 DDCS CONTROL			Settings for fibre optic channels		
70.01	CH0 NODE ADDR		Defines the node address for DDCS channel CH0. No two nodes online may have the same address.	1	R
	1…254	1 = 1	Node address		
70.02	CH0 LINK CONTROL		Defines the light intensity of the transmission LEDs. LEDs act as light sources for optic fibres which are connected to DDCS channel CH0. With the maximum length of fibre optic cable, set to 15.	10	R
	1…15	1 = 1	Light intensity		
70.03	CH0 BAUD RATE		Selects the communication speed of DDCS channel CH0. If FCI (Fieldbus Communication Interface) and fieldbus communication modules are used, the parameter has to be set to 4 Mbit/s. Otherwise, the external control system sets the communication speed automatically.	4 Mbit/s	I
	8 Mbit/s	0	8 Mbit/s (not in use)		
	4 Mbit/s	1	4 Mbit/s		
	2 Mbit/s	2	2 Mbit/s (not in use)		
	1 Mbit/s	3	1 Mbit/s		
70.04	CH0 TIMEOUT		Defines the time delay before channel CH0 or type Rxxx fieldbus adapter interface communication break alarm/fault (COMM MODULE) is activated. Time count starts when the link fails to update the communication message. Action taken by the PVS800 on a communication break is defined by parameter *70.05 CH0 COM LOSS CTRL*. When the parameter is set to zero, time is not monitored and COMM MODULE fault is not indicated regardless of the value of parameter *70.05 CH0 COM LOSS CTRL*.	100 ms	R
	0…60000 ms	1 = 1 ms	Time		

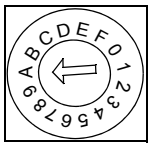
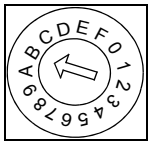
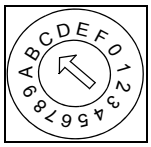
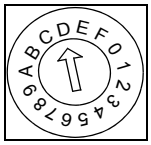
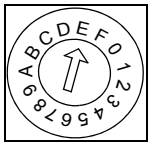
No.	Name/Value	FbEq	Description	Def	T
70.05	CH0 COM LOSS CTRL		Selects how the PVS800 reacts when communication error on DDCS channel CH0 or on type Rxxx fieldbus adapter interface has been detected. Time delay for the communication break alarm/fault activation is defined by parameter *70.04 CH0 TIMEOUT*. **Note:** This parameter is in use when external serial communication is activated by parameter *98.02* COMM. MODULE.	FAULT	I
	NO FAULT	1	PVS800 generates warning COMM MODULE.		
	FAULT	2	PVS800 trips on fault COMM MODULE.		
70.06	CH1 LINK CONTROL		Defines the light intensity of the transmission LEDs. LEDs act as light sources for optic fibres which are connected to DDCS channel CH1. With the maximum length of fibre optic cable, use value 15.	10	R
	1…15	1 = 1	Light intensity		
70.13	CH2 TIMEOUT		Defines the communication time-out for channel CH2 in milliseconds.	100 ms	I
	0…10000	1 = 1 ms	Time-out in milliseconds, 0 = not in use		
70.15	CH3 NODE ADDR		Defines the node address for DDCS channel CH3. No two nodes online may have the same address. Typically the setting needs to be changed when the master control unit is connected in a ring configuration which consists of several inverters and a PC with a DriveWindow PC tool. **Note:** The new node address becomes valid only after the next power-up of the control unit.	1	R
	1…254	1 = 1	Node address		
70.16	CH3 LINK CONTROL		Defines the light intensity of the transmission LEDs. LEDs act as light sources for optic fibres which are connected to DDCS channel CH3. With the maximum length of fibre optic cable, use value 15.	15	R
	1…15	1 = 1	Light intensity		
70.19	CH0 HW CONNECTION		Selects the topology of the DDCS channel CH0 link. **Note:** This parameter is not in use in the DriveBus mode.	RING	B
	RING	0	Devices are connected in a ring.		
	STAR	65535	Devices are connected in a star.		
70.20	CH3 HW CONNECTION		Selects the topology of the DDCS channel CH3 link.	STAR	B
	RING	0	Devices are connected in a ring.		
	STAR	65535	Devices are connected in a star.		
70.32	CH2 HW CONNECTION		Selects the topology of the DDCS channel CH2 link.	STAR	B
	RING	0	Devices are connected in a ring.		
	STAR	65535	Devices are connected in a star.		
71 DRIVEBUS COMM			Channel CH0 DriveBus settings		
71.01	CH0 DRIVEBUS MODE		Selects the communication mode for the DDCS channel CH0. New mode becomes valid only after the next power-up of the PVS800. Data is exchanged 4 times faster in the DriveBus mode than in the DDCS mode. Use the same value as the overriding control device.	NO	B
	NO	0	DDCS mode		
	YES	65535	DriveBus mode		

No.	Name/Value	FbEq	Description	Def	T
81 CH2 RECEIVE ADDR			Addresses where the master control program writes data words from DDCS CH2		
81.01	CH2 DS27 VAL 1		Defines an address where data word 1 of dataset 27 is written.	104	I
	0…20000	1 = 1	Update time is 500 ms.		
81.02	CH2 DS27 VAL 2		Defines an address where data word 2 of dataset 27 is written.	105	I
	0…20000	1 = 1	Update time is 500 ms.		
81.03	CH2 DS27 VAL 3		Defines an address where data word 3 of dataset 27 is written.	106	I
	0…20000	1 = 1	Update time is 500 ms.		
81.04	CH2 DS29 VAL 1		Defines an address where data word 1 of dataset 29 is written.	113	I
	0…20000	1 = 1	Update time is 500 ms.		
80.05	CH2 DS29 VAL 2		Defines an address where data word 2 of dataset 29 is written.	808	I
	0…20000	1 = 1	Update time is 500 ms.		
80.06	CH2 DS29 VAL 3		Defines an address where data word 3 of dataset 29 is written.	0	I
	0…20000	1 = 1	Update time is 500 ms.		
80.07	CH2 DS31 VAL 1		Defines an address where data word 1 of dataset 31 is written.	0	I
	0…20000	1 = 1	Update time is 500 ms.		
80.08	CH2 DS31 VAL 2		Defines an address where data word 2 of dataset 31 is written.	0	I
	0…20000	1 = 1	Update time is 500 ms.		
80.09	CH2 DS31 VAL 3		Defines an address where data word 3 of dataset 31 is written.	0	I
	0…20000	1 = 1	Update time is 500 ms.		
80.10	CH2 DS35 VAL 1		Defines an address where data word 1 of dataset 35 is written.	0	I
	0…20000	1 = 1	Update time is 500 ms.		
80.11	CH2 DS35 VAL 2		Defines an address where data word 2 of dataset 35 is written.	0	I
	0…20000	1 = 1	Update time is 500 ms.		
81.12	CH2 DS35 VAL 3		Defines an address where data word 3 of dataset 35 is written.	0	I
	0…20000	1 = 1	Update time is 500 ms.		
90 D SET REC ADDR			Addresses into which the master control program writes data sets received through CH0 (from the overriding control system). For more information, see the selected default actual signals or parameters.		
90.01	D SET 10 VAL 1		Defines the address into which the master control program writes value 1 of data set 10. Update time is 2 ms.	701	I
	0…20000	1 = 1	Parameter or actual signal address		
90.02	D SET 10 VAL 2		Defines the address into which the master control program writes value 2 of data set 10. Update time is 2 ms.	2301	I
	0…20000	1 = 1	Parameter or actual signal address		
90.03	D SET 10 VAL 3		Defines the address into which the master control program writes value 3 of data set 10. Update time is 2 ms.	2402	I
	0…20000	1 = 1	Parameter or actual signal address		
90.04	D SET 12 VAL 1		Defines the address into which the master control program writes value 1 of data set 12. Update time is 4 ms.	3116	I
	0…20000	1 = 1	Parameter or actual signal address		
90.05	D SET 12 VAL 2		Defines the address into which the master control program writes value 2 of data set 12. Update time is 4 ms.	0	I
	0…20000	1 = 1	Parameter or actual signal address		
90.06	D SET 12 VAL 3		Defines the address into which the master control program writes value 3 of data set 12. Update time is 4 ms.	0	I
	0…20000	1 = 1	Parameter or actual signal address		

No.	Name/Value	FbEq	Description	Def	T
…	…		…		
90.18	D SET 20 VAL 3		Defines the address into which the master control program writes value 3 of data set 20. Not in use by default.	0	I
	0…20000	1 = 1	Parameter or actual signal address		
91 D SET REC ADDR			Addresses into which the master control program writes data sets received through CH0 (from the overriding control system)		
91.01	D SET 22 VAL 1		Defines the address into which the master control program writes value 1 of data set 22. Not in use by default.	0	I
	0…20000	1 = 1	Parameter or actual signal address		
…	…		…		
91.06	D SET 24 VAL 3		Defines the address into which the master control program writes value 3 of data set 24. Not in use by default.	0	I
	0…20000	1 = 1	Parameter or actual signal address		
92 D SET TR ADDR			Addresses from which the master control program reads data sets to be sent through CH0 (to the overriding control system)		
92.01	D SET 11 VAL 1		Defines the address from which the master control program reads value 1 of data set 11. Update time is 2 ms.	801	I
	0…20000	1 = 1	Parameter or actual signal address		
92.02	D SET 11 VAL 2		Defines the address from which the master control program reads value 2 of data set 11. Update time is 2 ms.	110	I
	0…20000	1 = 1	Parameter or actual signal address		
92.03	D SET 11 VAL 3		Defines the address from which the master control program reads value 3 of data set 11. Update time is 2 ms.	107	I
	0…20000	1 = 1	Parameter or actual signal address		
92.04	D SET 13 VAL 1		Defines the address from which the master control program reads value 1 of data set 13. Update time is 4 ms.	0	I
	0…20000	1 = 1	Parameter or actual signal address		
92.05	D SET 13 VAL 2		Defines the address from which the master control program reads value 2 of data set 13. Update time is 4 ms.	0	I
	0…20000	1 = 1	Parameter or actual signal address		
92.06	D SET 13 VAL 3		Defines the address from which the master control program reads value 3 of data set 13. Update time is 4 ms.	0	I
	0…20000	1 = 1	Parameter or actual signal address		
92.07	D SET 15 VAL 1		Defines the address from which the master control program reads value 1 of data set 15. Update time is 10 ms. Not in use by default.	0	I
	0…20000	1 = 1	Parameter or actual signal address		
92.08	D SET 15 VAL 2		Defines the address from which the master control program reads value 2 of data set 15. Update time is 10 ms. Not in use by default.	0	I
	0…20000	1 = 1	Parameter or actual signal address		
92.09	D SET 15 VAL 3		Defines the address from which the master control program reads value 3 of data set 15. Update time is 10 ms. Not in use by default.	0	I
	0…20000	1 = 1	Parameter or actual signal address		
92.10	D SET 17 VAL 1		Defines the address from which the master control program reads value 1 of data set 17. Update time is 10 ms.	0	I
	0…20000	1 = 1	Parameter or actual signal address		

No.	Name/Value	FbEq	Description	Def	T
92.11	D SET 17 VAL 2		Defines the address from which the master control program reads value 2 of data set 17. Update time is 10 ms.	0	I
	0…20000	1 = 1	Parameter or actual signal address		
92.12	D SET 17 VAL 3		Defines the address from which the master control program reads value 3 of data set 17. Update time is 10 ms.	0	I
	0…20000	1 = 1	Parameter or actual signal address		
…	…		…		
92.18	D SET 21 VAL 3		Defines the address from which the master control program reads value 3 of data set 21. Not in use by default.	0	I
	0…20000	1 = 1	Parameter or actual signal address		
93 D SET TR ADDR			Addresses from which the master control program reads data sets to be sent through CH0 (to the overriding control system)		
93.01	D SET 23 VAL 1		Defines the address from which the master control program reads value 1 of data set 23. Not in use by default.	0	I
	0…20000	1 = 1	Parameter or actual signal address		
…	…		…		
93.06	D SET 25 VAL 3		Defines the address from which the master control program reads value 3 of data set 25. Not in use by default.	0	I
	0…20000	1 = 1	Parameter or actual signal address		
98 OPTION MODULES			Activation of optional modules and external serial communication. R-type fieldbus adapter modules are connected to Slot 1 or 2 of the control unit or via the optional AIMA-01 I/O Module Adapter connected to control unit DDCS channel CH1. Multiple AIMA-01 adapters are connected in a ring. N-type fieldbus adapter modules are connected to control unit DDCS channel CH0.		
98.02	COMM. MODULE		Selects an interface for the external control location.	NO	I
	NO	1	No external serial communication. Program is controlled through the I/O interface.		
	FIELDBUS	2	Program communicates through an Rxxx type fieldbus adapter or via DDCS channel CH0 using data sets 1 and 2. Data set 1 and 2 are typically used with Rxxx boards or fieldbus adapter modules. See also parameter group *51 MASTER ADAPTER*.		
	ADVANT/N-FB	3	Program communicates via DDCS channel CH0 using data sets 10 to 25. This selection is used with, for example, ABB Advant controllers and Nxxx fieldbus adapters. See also parameter groups *50 MASTER ADAPTER N*, *70 DDCS CONTROL* and *71 DRIVEBUS COMM*.		
	STD MODBUS	4	Program communicates through an RMBA-0x Modbus adapter module. See Modbus parameter settings in group *52 STANDARD MODBUS.*		

No.	Name/Value	FbEq	Description	Def	T
98.04	DI/O EXT1 LOC		Activates the communication to the optional digital I/O extension module 1 and defines the type and connection interface of the module. Faster DC input signal detection can be achieved by disabling the hardware filter of the digital input with the configuration DIP switch on the circuit board of the module. DIP switch S2 (RDIO) Hardware filtering Enabled / Disabled **Note:** Always enable the hardware filtering with an AC input signal.	NOT IN USE	I
	NDIO	1	Communication active. Module type: NDIO module. Connection interface: Fibre optic DDCS link (control unit channel CH1). **Note:** The module node number must be set to 5 with the DIP switch.		
	NOT IN USE	2	Inactive		
	RDIO-SLOT1	3	Communication active. Module type: RDIO. Connection interface: option slot 1 of the control unit.		
	RDIO-SLOT2	4	Communication active. Module type: RDIO. Connection interface: option slot 2 of the control unit.		
	RDIO-DDCS	5	Communication active. Module type: RDIO. Connection interface: Optional I/O module adapter (AIMA) that communicates with the control unit through a fibre optic DDCS link. **Note:** The module node number must be set to 5 with switch S1. 5 Switch S1 		
98.05	DI/O EXT2 LOC		See parameter *98.04 DI/O EXT1 LOC*. 6 Switch S1 	NOT IN USE	I
98.06	DI/O EXT3 LOC		See parameter *98.04 DI/O EXT1 LOC*. 7 Switch S1 	NOT IN USE	I
98.07	DI/O EXT4 LOC		See parameter *98.04 DI/O EXT1 LOC*. 8 Switch S1 	NOT IN USE	I
98.08	DI/O EXT5 LOC		See parameter *98.04 DI/O EXT1 LOC*. 9 Switch S1 	NOT IN USE	I

No.	Name/Value	FbEq	Description	Def	T
98.09	AI/O EXT1 LOC		Activates the communication to the optional analog I/O extension module 1, and defines the type and connection interface of the module.	NOT IN USE	I
	NAIO	1	Communication active. Module type: NAIO. Connection interface: Fibre optic DDCS link (control unit channel CH1). **Note:** The module node number must be set to A with the DIP switch.		
	NOT IN USE	2	Communication inactive		
	RAIO-SLOT1	3	Communication active. Module type: RAIO. Connection interface: option slot 1 of the control unit.		
	RAIO-SLOT2	4	Communication active. Module type: RAIO. Connection interface: option slot 2 of the control unit.		
	RAIO-DDCS	5	Communication active. Module type: RAIO. Connection interface: Optional I/O module adapter (AIMA) that communicates with the control unit through a fibre optic DDCS link. **Note:** The module node number must be set to A with switch S1. Switch S1 A 		
98.10	AI/O EXT2 LOC		See parameter *98.09 AI/O EXT1 LOC*. Switch S1 B 	NOT IN USE	I
98.11	AI/O EXT3 LOC		See parameter *98.09 AI/O EXT1 LOC*. Switch S1 C 	NOT IN USE	I
98.12	AI/O EXT4 LOC		See parameter *98.09 AI/O EXT1 LOC*. Switch S1 D 	NOT IN USE	I
98.13	AI/O EXT5 LOC		See parameter *98.09 AI/O EXT1 LOC*. Switch S1 E 	NOT IN USE	
99 START-UP DATA			Language, application macro selection, etc.		
99.01	LANGUAGE		Selects the display language.	ENG-LISH	I
99.02	APPLIC SELECTOR		Selects the application.	PHOTO-VOLTAIC	I
	PHOTOVOLTAIC	1	Solar inverter		
99.09	APPLIC RESTORE	I	Restores the original parameter settings.	0	
	NO	0	No		
	YES	1	Yes		

6

Inverter control program parameters

What this chapter contains

The chapter describes the parameters of the inverter control program of the PVS800. All connections discussed in the parameter descriptions of this chapter refer to those of the inverter control unit (RDCU unit, designation A41) unless otherwise indicated. This control unit is shown as “PVS800 xxxx_5PV” (“xxxx” depending on power rating), and has the ID number 2. The control program revision is of the format ISXR7xxx.

Parameter groups 10…99 are usually user-adjustable. Parameter groups 1…9 (actual signals) are only for monitoring and read-only, though data can be written into the Control Words (parameter group 7) through an external control system. Parameter changes through DriveWindow or CDP 312R control panel are stored to the FPROM memory and changes through external control system are stored to the RAM memory.

WARNING! The PVS800 is intended to be configurable through the parameters of the master control program (see page *43*), so adjusting inverter control program parameters should be performed with extreme care and only if absolutely necessary. Some parameters in the inverter control program may be accessed but are not listed in this manual at all; do not adjust these parameters without consulting with ABB as incorrect parameter values may cause malfunctioning or even damage to the equipment.

Note: Many parameters of the inverter control program are available through the master control program (see page *43*). In these cases, the description is provided at the master control program parameter; the *Description* field in the following table only includes a reference to the corresponding master control program (MCP) parameter and page number, for example “MCP *01.06 LINE CURRENT (45)*”.

Note: Some parameters cannot be changed when the PVS800 is running.

Terms and abbreviations

Term	Definition
Actual signal	Type of parameter that is the result of a measurement or calculation by the control program. Actual signals can be monitored, but not adjusted, by the user. Parameter groups 1…9 typically contain actual signals.
B	Boolean
C	Character string
Def.	Default value
FbEq	Fieldbus equivalent: The scaling between the value shown on the panel and the integer used in serial communication.
I	Integer
P	Pointer
PB	Packed Boolean
R	Real
T	Data type (see B, C, I, R, PB)

Parameter groups 01…09

No.	Name/Value	FbEq	Description	T
01 ACTUAL SIGNALS				
01.01	PV CELL DC	1 = 1 V	MCP *01.34 PV MODULE DC MEAS* (*46*)	R
01.05	FREQUENCY	100 = 1 Hz	Measured grid frequency	R
01.06	LINE CURRENT	1 = 1 A	MCP *01.07 AC CURRENT L1* (*45*)	R
01.07	REACTIVE POWER	1 = 1 kVAr	MCP *01.14 REACTIVE POWER* (*45*)	R
01.08	POWER	1 = 1 kW	MCP *01.10 AC POWER* (*45*)	R
01.09	POWER	100 = 1%	MCP *01.11 AC POWER* (*45*)	R
01.10	DC VOLTAGE	1 = 1 V	MCP *01.17 DC VOLTAGE* (*45*)	R
01.11	MAINS VOLTAGE	1 = 1 V	Measured grid voltage	R
01.12	PVS800 TEMP	1 = 1°C	MCP *01.20 INV TEMPERATURE* (*45*)	R
01.13	TIME OF USAGE	1 = 1 h	MCP *01.25 TIME OF USAGE* (*45*)	R
01.14	KWH SUPPLY	1 = 100 kWh	Energy fed into the network (= *01.17 KWH GENERATING* - *01.16 KWH MOTORING*). [kWh] Counter can be reset by parameter *16.09 RESET COUNTER*.	R
01.15	DI7-1 STATUS	1 = 1	Status of digital inputs DI7 (DIIL) to DI1. 0 VDC = “0” +24 VDC = “1”. Example: Control panel display when digital inputs DI1 and DI4 are activated is 0001001, where the digits for digital inputs are read from right to left (DI1 to DI7).	I
01.16	KWH MOTORING	1 = 100 kWh	Counts the kilowatt hours of power flow from network to the inverter. [kWh] Counter can be reset by parameter *16.09 RESET COUNTER*.	R
01.17	KWH GENERATING	1 = 100 kWh	MCP *01.26 ENERGY PRODUCED* (*45*)	R
01.19	AI1	10000 = 10 V or 20 mA	Non-scaled value of analog input AI [V]. See parameters *13.01 AI1 HIGH VALUE* and *13.02 AI1 LOW VALUE*.	R
01.20	AI2	20000 = 20 mA, 2 V or 10 V	Non-scaled value of analog input AI2 [mA]. See parameters *13.04 AI2 HIGH VALUE* and *13.05 AI2 LOW VALUE*.	R
01.21	AI3	20000 = 20 mA	Non-scaled value of analog input AI3 [mA]. See parameters *13.08 AI3 HIGH VALUE* and *13.09 AI3 LOW VALUE*.	R
01.22	RO3-1 STATUS	1 = 1	Status of the standard I/O board relay outputs Example: Control panel display when relay outputs 2 and 3 are activated is 0000110, where the digits are read from right to left (RO1 to RO3)	I
01.23	AO1	20000 = 20 mA	Value of analog output 1 signal [mA]. See parameter group *15 ANALOGUE OUTPUTS* for signal selection and scaling.	R
01.24	AO2	20000 = 20 mA	Value of analog output 2 signal [mA]. See parameter group *15 ANALOGUE OUTPUTS* for signal selection and scaling.	R
01.26	LED PANEL OUTP	1 = 1	NLMD-01 LED panel output [%]. See parameter group *18 LED PANEL CTRL*.	R
01.27	COS PHI	100 = 1	MCP *01.13 COS PHI* (*45*)	R
01.28	P LIMITED	1 = 1 kW	Maximum active power signal that the inverter unit can generate with nominal current *04.05 CONV NOM CURRENT*.	R
01.30	BREAKER COUNTER	1 = 1	MCP *01.30 BREAKER COUNTER* (*46*)	R

No.	Name/Value	FbEq	Description	T
01.31	FAN ON-TIME	1 = 1	Running time of the inverter cooling fan [h] Counter can be reset by parameter *16.09 RESET COUNTER*. Resetting is recommended when the fan is replaced.	R
01.32	EXT TMP 1	1 = 1 ºC	External temperature measurement.	R
01.33	EXT TMP 2	1 = 1 ºC	External temperature measurement.	R
01.34	EXT TMP 3	1 = 1 ºC	External temperature measurement.	R
01.35	EXT TMP 4	1 = 1 ºC	External temperature measurement.	R
01.36	CABINET TEMP 1	1 = 1 ºC	Displays a measured ICU cabinet temperature from PT100 connected to RMIO AI2	R
01.37	CABINET TEMP 2	1 = 1 ºC	Displays a measured DCU cabinet temperature from PT100 connected to RMIO AI3.	R
01.38	RUN-TIME	1 = 10 h	Running time counter. Runs when the inverter unit is modulating. Can be reset by using parameter *16.12 RESET RUN-TIME*.	R
01.39	EXT1 AI1	1 = 1	Non-scaled value of analog input AI1 on extension module 1. Range from 0 to maximum input value corresponds to 0…65520.	R
01.40	EXT1 AI2	1 = 1	Non-scaled value of analog input AI2 on extension module 1. Range from 0 to maximum input value corresponds to 0…65520.	R
01.41	EXT2 AI1	1 = 1	Non-scaled value of analog input AI1 on extension module 2. Range from 0 to maximum input value corresponds to 0…65520.	R
01.42	EXT2 AI2	1 = 1	Non-scaled value of analog input AI2 on extension module 2. Range from 0 to maximum input value corresponds to 0…65520.	R
01.43	DC CURRENT	1 = 1 A	Estimated DC current	R
01.44	DC POWER	1 = 1 kW	Estimated DC power	R
01.45	APPARENT POWER	1 = 1 kVA	Calculated apparent power.	R
01.46	LOST ENERGY AVG	1 = 1 kWh	Energy wasted whenever inverter power is limited by master control program parameter *31.16 POWER LIMITING* to a value below nominal. This value is a cumulative estimation based on average energy production.	R
02 ACTUAL SIGNALS				
02.05	DC REF Q-CTRL	1 = 1 V	Minimum voltage reference of DC circuit calculated by reactive power control [V]	R
02.06	DC REF RAMP	1 = 1 V	Ramped and limited DC circuit voltage reference for power control [V]	R
02.07	DC REF INITIALIZ	1 = 1 V	Initialized DC circuit voltage reference based on Line-side Identification. Voltage reference is calculated from DC voltage measurement and is approximately sqrt(2) × supply network voltage. [V]	R
02.10	NEG SEQUENCE VOLT	1 = 1 V	Negative sequence of the measured grid voltage.	R
02.11	U VOLTAGE RMS	1 = 1 V	Measured RMS voltage between phase U and ground. Phase voltages must be selected from parameter *40.24 RMS VOLTAGE CALC*.	R
02.12	V VOLTAGE RMS	1 = 1 V	Measured RMS voltage between phase V and ground	R
02.13	W VOLTAGE RMS	1 = 1 V	Measured RMS voltage between phase W and ground	R
02.14	U-V VOLTAGE RMS	1 = 1 V	Measured RMS voltage between phases U and V. Main voltages must be selected from *40.24 RMS VOLTAGE CALC*.	R
02.15	V-W VOLTAGE RMS	1 = 1 V	Measured RMS voltage between phases V and W	R
02.16	W-U VOLTAGE RMS	1 = 1 V	Measured RMS voltage between phases W and U	R

No.	Name/Value	FbEq	Description	T
02.17	UAC CTRL INPUT	1 = 1 V	AC control feedback signal. See group *24 REACTIVE POWER*.	R
02.18	GRID FREQUENCY	100 = 1 Hz	Measured grid frequency with accuracy of 10 mHz	R
02.19	GRID ROCOF	100 = 1 Hz	Displays the calculated grid frequency change rate (ROCOF, rate of change of frequency).	R
02.20	FLUX X ACT	1 = 1%	Flux vector X-component in percent of *04.04 CONV NOM VOLTAGE*.	R
02.21	FLUX Y ACT	1 = 1%	Flux vector Y-component in percent of *04.04 CONV NOM VOLTAGE*.	R
02.22	FLUX X NET ACT	1 = 1%	Measured grid voltage flux vector X-component in percent of *04.04 CONV NOM VOLTAGE*.	R
02.23	FLUX Y NET ACT	1 = 1%	Measured grid voltage flux vector Y-component in percent of *04.04 CONV NOM VOLTAGE*.	R
03 ACTUAL SIGNALS			Monitoring signals	
03.03	50 Hz IDENTIFIC		TRUE: 50 Hz is initialized base frequency.	B
03.04	60 Hz IDENTIFIC		TRUE: 60 Hz is initialized base frequency.	B
03.12	PP 1 TEMP	1 = 1ºC	Measured IGBT temperature of inverter module no. 1 [ºC]	R
03.13	PP 2 TEMP	1 = 1ºC	Measured IGBT temperature of inverter module no. 2 [ºC]	R
03.14	PP 3 TEMP	1 = 1ºC	Measured IGBT temperature of inverter module no. 3 [ºC]	R
03.15	PP 4 TEMP	1 = 1ºC	Measured IGBT temperature of inverter module no. 4 [ºC]	R
03.18	TEMP DIF MAX	1 = 1ºC	Maximum phase temperature difference [ºC]. Measured from all phases.	R
03.19	PHASE U TEMP DIF	1 = 1ºC	Temperature difference between individual module phase U and the average temperature of the rest of the modules [ºC]	R
03.20	PHASE V TEMP DIF	1 = 1ºC	Temperature difference between individual module phase V and the average temperature of the rest of the modules [ºC]	R
03.21	PHASE W TEMP DIF	1 = 1ºC	Temperature difference between individual module phase W and the average temperature of the rest of the modules [ºC]	R
03.43	PP 5 TEMP	1 = 1ºC	Measured IGBT temperature of inverter module no. 5 [ºC]	R
03.44	PP 6 TEMP	1 = 1ºC	Measured IGBT temperature of inverter module no. 6 [ºC]	R
03.45	PP 7 TEMP	1 = 1ºC	Measured IGBT temperature of inverter module no. 7 [ºC]	R
03.46	PP 8 TEMP	1 = 1ºC	Measured IGBT temperature of inverter module no. 8 [ºC]	R
03.47	PP 9 TEMP	1 = 1ºC	Measured IGBT temperature of inverter module no. 9 [ºC]	R
03.48	PP 10 TEMP	1 = 1ºC	Measured IGBT temperature of inverter module no. 10 [ºC]	R
03.49	PP 11 TEMP	1 = 1ºC	Measured IGBT temperature of inverter module no. 11 [ºC]	R
03.50	PP 12 TEMP	1 = 1ºC	Measured IGBT temperature of inverter module no. 12 [ºC]	R
04 INFORMATION			Program versions, inverter ratings	
04.01	SW PACKAGE VER	-	Displays the type and version of the firmware package in the inverter. For PVS800 inverter control program revision 7xxx, the designation is ISXR7xxx.	C
04.02	DTC VERSION	-	Inverter control software version. This fixed part of the control program consists of inverter control, operational system, communication control of the DDCS channels, and Modbus software of the control panel.	C
04.03	APPLIC NAME	-	Displays the type and version of the control program.	C
04.04	CONV NOM VOLTAGE	1 = 1 V	Downloaded nominal network voltage of the inverter [V]	R
04.05	CONV NOM CURRENT	1 = 1 A	Downloaded nominal current of the inverter [A]	R
04.06	CONV NOM POWER	1 = 1 kW	Inverter nominal power [kW]	R
04.07	CONV MAX VOLTAGE	1 = 1 V	Maximum value of inverter voltage measurement range [V]	R

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td>04.08</td><td>CONV MAX CURRENT</td><td>1 = 1 A</td><td>Maximum value of inverter current measurement range [A]</td><td>R</td></tr>
<tr><td>04.09</td><td>INVERTER TYPE</td><td>-</td><td>Inverter type</td><td>C</td></tr>
<tr><td>04.10</td><td>APBU EPLD VERSION</td><td>-</td><td>APBU branching unit logic version. Default: NO LOGIC.</td><td>C</td></tr>
<tr><td>04.11</td><td>BOARD TYPE</td><td>-</td><td>Shows the control board type.</td><td>C</td></tr>
<tr><td>04.12</td><td>PARAMETER CRC16</td><td>-</td><td>Checksum of parameter settings in the loading package.</td><td>C</td></tr>
<tr><td colspan="3">07 CONTROL WORDS</td><td>Control words</td><td></td></tr>
<tr><td>07.01</td><td>MAIN CTRL WORD</td><td></td><td>Main control word of the inverter.
<table>
<tr><th>Bit</th><th>Name</th><th>Value</th><th>Description</th></tr>
<tr><td>0</td><td>ON/OFF</td><td>0 ⇒1</td><td>Start charging (close charging contactor)</td></tr>
<tr><td></td><td></td><td>0</td><td>Open main contactor (switch power off)</td></tr>
<tr><td>1…2</td><td colspan="3">Reserved</td></tr>
<tr><td>3</td><td>START</td><td>1</td><td>Start modulation</td></tr>
<tr><td></td><td></td><td>0</td><td>Stop modulation</td></tr>
<tr><td>4…6</td><td colspan="3">Reserved</td></tr>
<tr><td>7</td><td>RESET</td><td>0 ⇒1</td><td>Reset</td></tr>
<tr><td>8…15</td><td colspan="3">Reserved</td></tr>
</table></td><td>PB</td></tr>
<tr><td>07.03</td><td>AUX CTRL WORD 2</td><td></td><td>Control word for digital outputs on RDIO modules 1 and 2. The selection parameters of those outputs (14.06…14.09) are connected to this signal by default.
<table>
<tr><th>Bit</th><th>Name</th><th>Value</th><th>Description</th></tr>
<tr><td>0</td><td>EXT1_DO1</td><td>1</td><td>Energize DO1 on extension module 1.</td></tr>
<tr><td>1</td><td>EXT1_DO2</td><td>1</td><td>Energize DO2 on extension module 1.</td></tr>
<tr><td>2</td><td>EXT2_DO1</td><td>1</td><td>Energize DO1 on extension module 2.</td></tr>
<tr><td>3</td><td>EXT2_DO2</td><td>1</td><td>Energize DO2 on extension module 2.</td></tr>
<tr><td>4…15</td><td colspan="3">Reserved</td></tr>
</table></td><td>PB</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td>07.04</td><td>MPPT CMW</td><td></td><td>Command word for the MPPT mode.
Note: This word can be used for monitoring only.
<table>
<tr><th>Bit</th><th>Value</th><th>Description</th></tr>
<tr><td>0</td><td>1</td><td>Enable the MPPT mode</td></tr>
<tr><td>1</td><td>1</td><td>Enable DC level difference tracking</td></tr>
<tr><td>2</td><td>1</td><td>Enable lost energy calculation</td></tr>
<tr><td>3</td><td>1</td><td>Enable external DC reference for MPPT</td></tr>
<tr><td>4</td><td>1</td><td>Close the DC breaker</td></tr>
<tr><td>5</td><td>1</td><td>Open the DC breaker</td></tr>
<tr><td>6</td><td>1</td><td>Enable the DC contactor use</td></tr>
<tr><td>7</td><td>1</td><td>Enable trip signal monitoring of the DC breaker</td></tr>
<tr><td>8</td><td>1</td><td>Eenable temperature monitoring of the inverter module</td></tr>
<tr><td>9</td><td>1</td><td>Enable the Lost energy warning</td></tr>
<tr><td>10</td><td>1</td><td>Enable the DC reference maximum / minimum warning</td></tr>
<tr><td>11…15</td><td colspan="2">Reserved</td></tr>
</table></td><td>PB</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td colspan="3">08 STATUS WORDS</td><td>Status words</td><td></td></tr>
<tr><td>08.01</td><td>MAIN STATUS WORD</td><td></td><td>Main Status Word.
<table>
<tr><th>Bit</th><th>Name</th><th>Value</th><th>STATE/Description</th></tr>
<tr><td>0</td><td>RDY_ON</td><td>1</td><td>Ready to switch on = no fault</td></tr>
<tr><td>1</td><td>RDY_RUN</td><td>1</td><td>Ready to operate = DC bus charged</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">RDY_REF</td><td>1</td><td>Operation enabled</td></tr>
<tr><td>0</td><td>Operation inhibited</td></tr>
<tr><td>3</td><td>TRIPPED</td><td>1</td><td>Fault. See also FLT (xx) (page 162).</td></tr>
<tr><td>4…6</td><td colspan="3">Reserved</td></tr>
<tr><td>7</td><td>ALARM</td><td>1</td><td>Warning. See also ALM (xx) (page 157).</td></tr>
<tr><td>8</td><td>MODULATING</td><td>1</td><td>Inverter is modulating</td></tr>
<tr><td rowspan="2">9</td><td rowspan="2">REMOTE</td><td>1</td><td>Control location: REMOTE</td></tr>
<tr><td>0</td><td>Control location: LOCAL</td></tr>
<tr><td>10</td><td rowspan="2">NET OK</td><td>1</td><td>Grid voltage is OK</td></tr>
<tr><td></td><td>0</td><td>Grid voltage is lost</td></tr>
<tr><td>11</td><td>LEVEL1 DIP</td><td>1</td><td>Measured grid voltage is less than 40.10 RT U/Un LEVEL1. Bit status is updated if 40.01 LVRT MODE is activated.</td></tr>
<tr><td>12</td><td>EXTENDED DIP</td><td>1</td><td>Bit 11 has been on for the time defined by 40.13 RT U/Un DELTA t1. Bit status is updated if 40.01 LVRT MODE is activated.</td></tr>
<tr><td rowspan="2">13</td><td rowspan="2">CHARGING OR RDY_RUN</td><td></td><td>Combines bits 14 and 1.</td></tr>
<tr><td>1</td><td>Ready to operate or charging contactor closed</td></tr>
<tr><td>14</td><td>CHARGING</td><td>1</td><td>Charging contactor closed</td></tr>
<tr><td>15</td><td colspan="3">Reserved</td></tr>
</table></td><td>PB</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td>08.03</td><td>LIMIT WORD</td><td></td><td>Limit word.
<table>
<tr><th>Bit</th><th>Name</th><th>Value</th><th>Description</th></tr>
<tr><td>0…1</td><td colspan="3">Reserved</td></tr>
<tr><td>2</td><td>CAP REF LIMIT</td><td>1</td><td>Capacitive current reference above limit</td></tr>
<tr><td>3</td><td>IND REF LIMIT</td><td>1</td><td>Inductive current reference above limit</td></tr>
<tr><td>4</td><td>DC REF MAX LIM</td><td>1</td><td>02.05 DC REF Q-CTRL is above the maximum DC voltage reference</td></tr>
<tr><td>5</td><td>Q CUR LIM</td><td>1</td><td>Reactive current is limited because 01.06 LINE CURRENT has reached the current limit</td></tr>
<tr><td>6</td><td>GRID POW LIM</td><td>1</td><td>Instantaneous active power limitation</td></tr>
<tr><td>7</td><td>DC POW LIM</td><td>1</td><td>Active power to the solar generator is limited</td></tr>
<tr><td>8</td><td>POW FREQ LIM</td><td>1</td><td>Active power is limited because of grid over frequency</td></tr>
<tr><td>9</td><td>GRID FILT POW LIM</td><td>1</td><td>Active power fed to the grid is limited</td></tr>
<tr><td>10…15</td><td colspan="3">Reserved</td></tr>
</table></td><td>PB</td></tr>
<tr><td>08.05</td><td>DI STATUS WORD</td><td></td><td>Inverter control unit digital input status word.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>DI1</td><td>Inverter control unit DI1 status</td></tr>
<tr><td>1</td><td>DI2</td><td>Inverter control unit DI2 status</td></tr>
<tr><td>2</td><td>DI3</td><td>Inverter control unit DI3 status</td></tr>
<tr><td>3</td><td>DI4</td><td>Inverter control unit DI4 status</td></tr>
<tr><td>4</td><td>DI5</td><td>Inverter control unit DI5 status</td></tr>
<tr><td>5</td><td>DI6</td><td>Inverter control unit DI6 status</td></tr>
<tr><td>6</td><td>DI7 (DIIL)</td><td>Inverter control unit DI7 (DIIL) status</td></tr>
<tr><td>7</td><td>EXT1_DI1</td><td>RDIO module 1, DI1 status</td></tr>
<tr><td>8</td><td>EXT1_DI2</td><td>RDIO module 1, DI2 status</td></tr>
<tr><td>9</td><td>EXT1_DI3</td><td>RDIO module 1, DI3 status</td></tr>
<tr><td>10</td><td>EXT2_DI1</td><td>RDIO module 2, DI1 status</td></tr>
<tr><td>11</td><td>EXT2_DI2</td><td>RDIO module 2, DI2 status</td></tr>
<tr><td>12</td><td>EXT2_DI3</td><td>RDIO module 2, DI3 status</td></tr>
<tr><td>13…15</td><td colspan="2">Reserved</td></tr>
</table></td><td>PB</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td>08.06</td><td>MPPT STATUS</td><td></td><td>MPPT status word.
<table>
<tr><th>Bit</th><th>Name</th><th>Value</th><th>Description</th></tr>
<tr><td>0</td><td>MPPT</td><td>1</td><td>Inverter running in the MPPT mode. See parameter 39.01 MPPT CONTROL (page 126).</td></tr>
<tr><td>1</td><td>LOCAL MODE</td><td>1</td><td>Inverter in the local control mode, MPPT disabled, DC switch open.</td></tr>
<tr><td>2</td><td>START MPPT</td><td>1</td><td>Start command received; DC precharge or DC switch closure in progress before entering the MPPT mode.</td></tr>
<tr><td>3</td><td>RELAY INIT</td><td>0</td><td>Inverter unit initializing after power-on. Master control program remains in the STANDBY state.</td></tr>
<tr><td></td><td></td><td>1</td><td>Inverter unit ready.</td></tr>
<tr><td>4</td><td>DCBRK STA</td><td>1</td><td>DC switch closed.</td></tr>
<tr><td>5</td><td>RESTART</td><td>1</td><td>Grid monitoring relay has signaled a network failure. Inverter unit parametrized to restart after delay.</td></tr>
<tr><td>6</td><td>LOST ENERGY</td><td>1</td><td>Lost energy calculation active. Power limit set lower than PVS800 nominal power.</td></tr>
<tr><td>7</td><td>START ENA</td><td>1</td><td>Start is enabled by cut-in conditions. See parameters 44.18…44.22 (page 136).</td></tr>
<tr><td>8</td><td>DC REF MIN</td><td>1</td><td>MPPT has reached the minimum DC reference. Check 39.05 MPPT DC REF MIN (page 126).</td></tr>
<tr><td>9</td><td>DC REF MAX</td><td>1</td><td>MPPT has reached the maximum DC reference. Check parameter 39.04 MPPT DC REF MAX (page 126).</td></tr>
<tr><td>10</td><td>DC CTRL LIM</td><td>1</td><td>External DC reference cannot be maintained because of power limiting.</td></tr>
<tr><td>11…15</td><td colspan="3">Reserved</td></tr>
</table>
See also 08.05 PVA STATES in the master control program (page 52).</td><td>PB</td></tr>
<tr><td>08.22</td><td>INT CONFIG WORD</td><td></td><td>16-bit data word. Number of inverter units recognized by the control program during PPCC link initialization.
Bit 0 = INT1 = Inverter 1 INT board
…
Bit 11 = INT12 = Inverter 12 INT board</td><td>PB</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td>08.24</td><td>GD DISABLE WORD</td><td></td><td>Gate driver disable fault word.
<table>
<tr><th>Bit</th><th>Description</th></tr>
<tr><td>0</td><td>GD DISABLE (FF53) (page 162)</td></tr>
<tr><td>1</td><td>GD DISABLE 1 (54A2) (page 162)</td></tr>
<tr><td>2</td><td>GD DISABLE 2 (54A3) (page 162)</td></tr>
<tr><td>3…15</td><td>Reserved</td></tr>
<tr><td colspan="2">Bit value: 1 = fault, 0 = no fault</td></tr>
</table></td><td>PB</td></tr>
<tr><td>08.31</td><td>AINT TYPE</td><td></td><td>Shows the AINT/AGDR configuration data read from the inverter module specified by parameter 16.11 PBU CH AINT CHK.
The control program reads the configuration data from all parallel-connected inverter modules at power-up. All modules must return the same configuration data. In case of a mismatch, a fault is generated.
The configuration data shown by 08.31 AINT TYPE is coded as follows:
<table>
<tr><th></th><th colspan="3">Configuration data</th></tr>
<tr><th>AINT board type (AINT-…)</th><th>AGDR du/dt configuration</th><th>AINT ID</th><th>AINT ASIC ID</th></tr>
<tr><td>01(C)</td><td rowspan="5">0 or 7</td><td>1</td><td>215</td></tr>
<tr><td>02(C)</td><td>1</td><td>231</td></tr>
<tr><td>11/12/14(C)</td><td>2</td><td>215</td></tr>
<tr><td>14D</td><td>2</td><td>231</td></tr>
<tr><td>24</td><td>4</td><td>231</td></tr>
</table>
For example, if this parameter displays the value 74231, the module selected by 16.11 has an AINT-24 board, and the du/dt configuration of its AGDR board is 7.</td><td>I</td></tr>
<tr><td colspan="2">09 FAULT WORDS</td><td></td><td>Fault and alarm words</td><td></td></tr>
<tr><td>09.01</td><td>FAULT WORD 1</td><td></td><td>Fault word 1.
<table>
<tr><th>Bit</th><th>Fault</th></tr>
<tr><td>0</td><td>SHORT CIRC (2340) (page 166)</td></tr>
<tr><td>1</td><td>OVERCURRENT (2310) (page 164)</td></tr>
<tr><td>2</td><td>DC OVERVOLT (3210) (page 159)</td></tr>
<tr><td>3</td><td>PVS800 TEMP (4210) (page 165)</td></tr>
<tr><td>4</td><td>EARTH FAULT (2330) (page 161)</td></tr>
<tr><td>5</td><td>HIGH UAC PEAK (32A4) or HIGH UAC LEV (32A5) (page 162)</td></tr>
<tr><td>6</td><td>Reserved</td></tr>
<tr><td>7</td><td>INTERNAL FAULT (page 163)</td></tr>
<tr><td>8</td><td>AC UNDERFREQ (3142) (page 157)</td></tr>
<tr><td>9</td><td>AC OVERFREQ (3141) (page 157)</td></tr>
<tr><td>10</td><td>AC UNDERVOLT (3120) (page 157)</td></tr>
<tr><td>11</td><td>AC OVERVOLT (3110) (page 157)</td></tr>
<tr><td>12…15</td><td>Reserved</td></tr>
<tr><td colspan="2">Bit value: 1 = fault, 0 = no fault</td></tr>
</table></td><td>PB</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td>09.02</td><td>FAULT WORD 2</td><td></td><td>Fault word 2.<table><tr><th>Bit</th><th>Fault</th></tr><tr><td>0</td><td>SUPPLY PHASE (3130) (page 166)</td></tr><tr><td>1</td><td>Reserved</td></tr><tr><td>2</td><td>DC UNDERVOLT (3220) (page 160)</td></tr><tr><td>3</td><td>Reserved</td></tr><tr><td>4…5</td><td>Reserved</td></tr><tr><td>6</td><td>IO FAULT (7000) (page 163)</td></tr><tr><td>7</td><td>CTRL B TEMP (4110) (page 159)</td></tr><tr><td>8</td><td>Reserved</td></tr><tr><td>9</td><td>OVER SWFREQ (FF55) (page 164)</td></tr><tr><td>10</td><td>Reserved</td></tr><tr><td>11</td><td>PPCC LINK (5210) (page 165)</td></tr><tr><td>12</td><td>COMM MODULE (7510) (page 159)</td></tr><tr><td>13…15</td><td>Reserved</td></tr><tr><td colspan="2">Bit value: 1 = fault, 0 = no fault</td></tr></table></td><td>PB</td></tr>
<tr><td>09.03</td><td>FAULT WORD 3</td><td></td><td>Fault word 3.<table><tr><th>Bit</th><th>Fault</th></tr><tr><td>0…1</td><td>Reserved</td></tr><tr><td>2</td><td>EXT TMP1 HIGH (4491) (page 162) or EXT TMP1 LOW (4495) (page 162)</td></tr><tr><td>3</td><td>EXT TMP2 HIGH (4492) (page 162) or EXT TMP2 LOW (4496) (page 162)</td></tr><tr><td>4</td><td>EXT TMP3 HIGH (4493) (page 162) or EXT TMP3 LOW (4497) (page 162)</td></tr><tr><td>5</td><td>EXT TMP4 HIGH (4494) (page 162) or EXT TMP4 LOW (4498) (page 162)</td></tr><tr><td>6…7</td><td>Reserved</td></tr><tr><td>8…11</td><td>Reserved</td></tr><tr><td>12</td><td>INV OVERTEMP (4290) (page 163)</td></tr><tr><td>13</td><td>Reserved</td></tr><tr><td>14</td><td>MOD BOARD T (FF88) (page 163)</td></tr><tr><td>15</td><td>Reserved</td></tr><tr><td colspan="2">Bit value: 1 = fault, 0 = no fault</td></tr></table></td><td>PB</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td>09.04</td><td>ALARM WORD 1</td><td></td><td>Alarm word 1.<table><tr><th>Bit</th><th>Fault</th></tr><tr><td>0…1</td><td>Reserved</td></tr><tr><td>2</td><td>EXT TMP1 HIGH (4491) (page 162) or EXT TMP1 LOW (4495) (page 162)</td></tr><tr><td>3</td><td>EXT TMP2 HIGH (4492) (page 162) or EXT TMP2 LOW (4496) (page 162)</td></tr><tr><td>4</td><td>EXT TMP3 HIGH (4493) (page 162) or EXT TMP3 LOW (4497) (page 162)</td></tr><tr><td>5</td><td>EXT TMP4 HIGH (4494) (page 162) or EXT TMP4 LOW (4498) (page 162)</td></tr><tr><td>6</td><td>T MEAS CIRC (FF91) (page 167)</td></tr><tr><td>7</td><td>Reserved</td></tr><tr><td>8…9</td><td>Reserved</td></tr><tr><td>10</td><td>EXT ANALOG IO (7081) (page 161)</td></tr><tr><td>11</td><td>Reserved</td></tr><tr><td>12</td><td>INV OVERTEMP (4293) (page 163)</td></tr><tr><td>13</td><td>Reserved</td></tr><tr><td>14</td><td>MOD BOARD T (FF92) (page 163)</td></tr><tr><td>15</td><td>Reserved</td></tr><tr><td colspan="2">Bit value: 1 = alarm, 0 = no alarm</td></tr></table></td><td>PB</td></tr>
<tr><td>09.10</td><td>PV FLT ALM WORD</td><td></td><td>Fault/Alarm word.<table><tr><th>Bit</th><th>Fault/Alarm</th></tr><tr><td>0</td><td>GRID MON FLT (8189) (page 162)</td></tr><tr><td>1</td><td>Reserved</td></tr><tr><td>2</td><td>REVERSE POW (8187) (page 166) (peak)</td></tr><tr><td>3</td><td>DC SWITCH LEV (818C) (page 160)</td></tr><tr><td>4</td><td>DC SWITCH POS (818D) (page 160)</td></tr><tr><td>5</td><td>REVERSE POW (8187) (page 166) (level)</td></tr><tr><td>6</td><td>Reserved</td></tr><tr><td>7</td><td>LOST ENERGY (8192) (page 163)</td></tr><tr><td>8</td><td>GRID MON ALM (8191) (page 162)</td></tr><tr><td>9</td><td>PVS&PANEL DC (32A8) (page 165)</td></tr><tr><td>10</td><td>Reserved</td></tr><tr><td>11</td><td>ANTI-ISLAND (8193) (page 158)</td></tr><tr><td>12</td><td>DCREF MIN RNG (32AB) (page 160)</td></tr><tr><td>13</td><td>DCREF MAX RNG (32AC) (page 160)</td></tr><tr><td>14…15</td><td>Reserved</td></tr><tr><td colspan="2">Bit value: 1 = fault/alarm, 0 = no fault/alarm</td></tr></table></td><td>PB</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td>09.11</td><td>SUPPLY FAULT WORD</td><td></td><td>Inverter unit fault word. If the inverter unit consists of parallel-connected modules, a fault is indicated by this word if it is present in any module.<table><tr><th>Bit</th><th>Fault</th></tr><tr><td>0</td><td>CHARGING FLT (3230) (page 159)</td></tr><tr><td>1</td><td>OVERCURRENT (2310) (page 164)</td></tr><tr><td>2</td><td>EXT EVENT DI5 (9085) (page 161)</td></tr><tr><td>3</td><td>PVS800 TEMP (4210) (page 165)</td></tr><tr><td>4</td><td>EXT EVENT DI4 (9084) (page 161)</td></tr><tr><td>5</td><td>DI1 (9088) (page 160)</td></tr><tr><td>6</td><td>MAIN CNT FLT (FF17) (page 163)</td></tr><tr><td>7</td><td>SHORT CIRC (2340) (page 166)</td></tr><tr><td>8</td><td>INTERNAL FAULT (page 163)</td></tr><tr><td>9</td><td>NET VOLT FLT (3100)/(32A2) (page 163)</td></tr><tr><td>10</td><td>COMM MODULE (7510) (page 159)</td></tr><tr><td>11</td><td>EXT EVNT DI7 (908E) (page 161)</td></tr><tr><td>12</td><td>EARTH FAULT (2387) (page 160)</td></tr><tr><td>13</td><td>Reserved</td></tr><tr><td>14</td><td>DC UNDERVOLT (3220) (page 160)</td></tr><tr><td>15</td><td>DC OVERVOLT (3210) (page 159)</td></tr><tr><td colspan="2">Bit value: 1 = fault, 0 = no fault</td></tr></table></td><td>PB</td></tr>
<tr><td>09.12</td><td>SUPPLY ALARM WORD</td><td></td><td>Inverter unit alarm word.<table><tr><th>Bit</th><th>Fault</th></tr><tr><td>0</td><td>COMM MODULE (7510) (page 159)</td></tr><tr><td>1</td><td>PANEL LOST (5300) (page 164)</td></tr><tr><td>2</td><td>DI1 (9081) (page 160)</td></tr><tr><td>3</td><td>AI<MIN FUNC (8110) (page 157)</td></tr><tr><td>4</td><td>PVS800 TEMP (4210) (page 165)</td></tr><tr><td>5</td><td>Reserved</td></tr><tr><td>6</td><td>PLIM EXT TMP (44A0) (page 164)</td></tr><tr><td>7</td><td>QLIM PVS TMP (44A2) (page 166)</td></tr><tr><td>8…9</td><td>Reserved</td></tr><tr><td>10</td><td>NET LOST (32A3) (page 163)</td></tr><tr><td>11</td><td>EXT EVNT DI7 (908E) (page 161)</td></tr><tr><td>12</td><td>Reserved</td></tr><tr><td>13</td><td>EARTH FAULT (2387) (page 160) or EXT EVNT DI4 (908B) (page 161)</td></tr><tr><td>14</td><td>EXT EVNT DI5 (908C) (page 161)</td></tr><tr><td>15</td><td>Reserved</td></tr><tr><td colspan="2">Bit value: 1 = alarm, 0 = no alarm</td></tr></table></td><td>PB</td></tr>
</table>

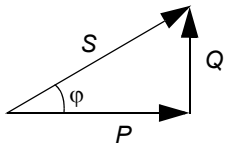
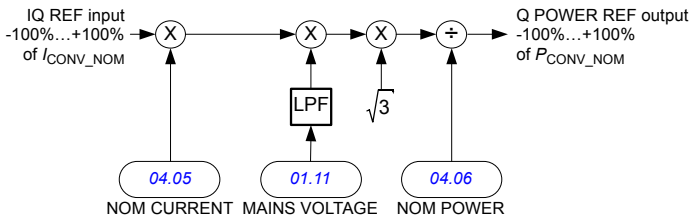
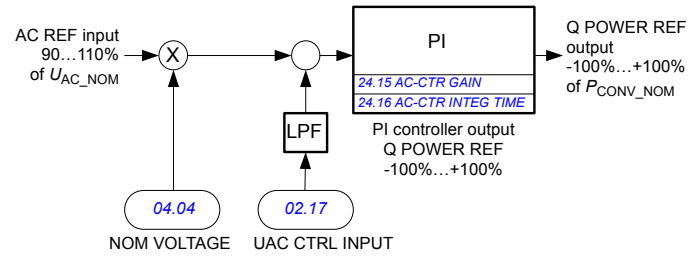
<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td>09.13</td><td>CURRENT UNBALANCE</td><td></td><td>Current unbalance fault word.<table><tr><th>Bit</th><th>Fault</th></tr><tr><td>0</td><td>CUR UNBAL 1 (23E0) (page 159)</td></tr><tr><td>1</td><td>CUR UNBAL 2 (23E1) (page 159)</td></tr><tr><td>2…15</td><td>Reserved</td></tr><tr><td colspan="2">Bit value: 1 = fault, 0 = no fault</td></tr></table></td><td>PB</td></tr>
<tr><td>09.14</td><td>OVERCURRENT FAULT</td><td></td><td>Overcurrent fault word.<table><tr><th>Bit</th><th>Fault</th></tr><tr><td>0</td><td>OVERCURR 1 (23A0) (page 164)</td></tr><tr><td>1</td><td>OVERCURR 2 (23A1) (page 164)</td></tr><tr><td>2…15</td><td>Reserved</td></tr><tr><td colspan="2">Bit value: 1 = fault, 0 = no fault</td></tr></table></td><td>PB</td></tr>
<tr><td>09.15</td><td>SHORT CIRC FAULT</td><td></td><td>Short circuit fault word.<table><tr><th>Bit</th><th>Fault</th></tr><tr><td>0</td><td>SC INV 1 U (23B0), SC INV 1 V (23B1) or SC INV 1 W (23B2) (page 166)</td></tr><tr><td>1</td><td>SC INV 2 U (23B3), SC INV 2 V (23B4) or SC INV 2 W (23B5) (page 166)</td></tr><tr><td>2…11</td><td>Reserved</td></tr><tr><td>12</td><td>Short circuit in phase U of the faulted module</td></tr><tr><td>13</td><td>Short circuit in phase V of the faulted module</td></tr><tr><td>14</td><td>Short circuit in phase W of the faulted module</td></tr><tr><td>15</td><td>Reserved</td></tr><tr><td colspan="2">Bit value: 1 = fault, 0 = no fault</td></tr></table></td><td>PB</td></tr>
<tr><td>09.16</td><td>OVERTEMP WORD</td><td></td><td>Overtemperature fault word.<table><tr><th>Bit</th><th>Fault</th></tr><tr><td>0</td><td>PVS TEMP 1 U (42A0), PVS TEMP 1 V (42A1) or PVS TEMP 2 W (42A5) (page 165)</td></tr><tr><td>1</td><td>PVS TEMP 2 U (42A3), PVS TEMP 2 V (42A4) or PVS TEMP 2 W (42A5) (page 165)</td></tr><tr><td>2…11</td><td>Reserved</td></tr><tr><td>12</td><td>Overtemperature in phase U of the faulted module</td></tr><tr><td>13</td><td>Overtemperature in phase V of the faulted module</td></tr><tr><td>14</td><td>Overtemperature in phase W of the faulted module</td></tr><tr><td>15</td><td>Reserved</td></tr><tr><td colspan="2">Bit value: 1 = fault, 0 = no fault</td></tr></table></td><td>PB</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>T</th></tr>
<tr><td>09.17</td><td>TEMP DIF FLT WORD</td><td></td><td>Temperature difference fault word.<table><tr><th>Bit</th><th>Fault</th></tr><tr><td>0</td><td>TEMP DIF 1 U (4381), TEMP DIF 1 V (4382) or TEMP DIF 1 W (4383) (page 167)</td></tr><tr><td>1</td><td>TEMP DIF 2 U (4384), TEMP DIF 2 V (4385) or TEMP DIF 2 W (4386) (page 167)</td></tr><tr><td>2…11</td><td>Reserved</td></tr><tr><td>12</td><td>Temperature difference fault in phase U of the faulted module</td></tr><tr><td>13</td><td>Temperature difference fault in phase V of the faulted module</td></tr><tr><td>14</td><td>Temperature difference fault in phase W of the faulted module</td></tr><tr><td>15</td><td>Reserved</td></tr><tr><td colspan="2">Bit value: 1 = fault, 0 = no fault</td></tr></table></td><td>PB</td></tr>
<tr><td>09.18</td><td>TEMP DIF ALM WORD</td><td></td><td>Temperature difference alarm word.<table><tr><th>Bit</th><th>Fault</th></tr><tr><td>0</td><td>TEMP DIF 1 U (44B1), TEMP DIF 1 V (44B2) or TEMP DIF 1 W (44B3) (page 167)</td></tr><tr><td>1</td><td>TEMP DIF 2 U (44B4), TEMP DIF 2 V (44B5) or TEMP DIF 2 W (44B6) (page 167)</td></tr><tr><td>2…11</td><td>Reserved</td></tr><tr><td>12</td><td>Temperature difference alarm in phase U of the faulted module</td></tr><tr><td>13</td><td>Temperature difference alarm in phase V of the faulted module</td></tr><tr><td>14</td><td>Temperature difference alarm in phase W of the faulted module</td></tr><tr><td>15</td><td>Reserved</td></tr><tr><td colspan="2">Bit value: 1 = alarm, 0 = no alarm</td></tr></table></td><td>PB</td></tr>
<tr><td>09.24</td><td>PPCC FAULT WORD</td><td></td><td>PPCC communication fault word.<table><tr><th>Bit</th><th>Description</th></tr><tr><td>0</td><td>PPCC LINK (5210) (page 165)</td></tr><tr><td>1</td><td>PPCC LINK 1 (5280) (page 165)</td></tr><tr><td>2</td><td>PPCC LINK 2 (5281) (page 165)</td></tr><tr><td>3…15</td><td>Reserved</td></tr><tr><td colspan="2">Bit value: 1 = fault, 0 = no fault</td></tr></table></td><td>PB</td></tr>
<tr><td>09.25</td><td>POWERFAIL FAULT</td><td></td><td>AINT board power failure word.<table><tr><th>Bit</th><th>Description</th></tr><tr><td>0</td><td>POWERFAIL (3381) (page 164)</td></tr><tr><td>1</td><td>POWERF INV 1 (3382) (page 164)</td></tr><tr><td>2</td><td>POWERF INV 2 (3383) (page 164)</td></tr><tr><td>3…15</td><td>Reserved</td></tr><tr><td colspan="2">Bit value: 1 = fault, 0 = no fault</td></tr></table></td><td>PB</td></tr>
</table>

No.	Name/Value	FbEq	Description	T
09.30	FAULT CODE 1 LAST		Fieldbus code of the latest alarm/fault. See chapter *Fault tracing*. The fault buffer can be reset using parameter *16.16 RESET FLT/ALM BUF* (page *117*).	PB
09.31	FAULT CODE 2 LAST		Fieldbus code of the 2nd latest alarm/fault	PB
09.32	FAULT CODE 3 LAST		Fieldbus code of the 3rd latest alarm/fault	PB
09.33	FAULT CODE 4 LAST		Fieldbus code of the 4th latest alarm/fault	PB
09.34	FAULT CODE 5 LAST		Fieldbus code of the 5th latest alarm/fault	PB
09.35	FAULT CODE 6 LAST		Fieldbus code of the 6th latest alarm/fault	PB
09.36	FAULT CODE 7 LAST		Fieldbus code of the 7th latest alarm/fault	PB
09.37	FAULT CODE 8 LAST		Fieldbus code of the 8th latest alarm/fault	PB
09.38	FAULT CODE 9 LAST		Fieldbus code of the 9th latest alarm/fault	PB
09.39	FAULT CODE 10 LAST		Fieldbus code of the 10th latest alarm/fault	PB

Parameter groups 11…99

No.	Name/Value	FbEq	Description	Def.	T
18 LED PANEL CTRL			The Inverter Monitoring Display has a LED bar to show an absolute real type value. 0 50 100 150% The source and the scale of the display signal are defined by this parameter group. **Note:** If the Inverter Monitoring Display and CDP 312R Control Panel are used together, actual signal *01.26 LED PANEL OUTP* must be the first signal in the CDP 312R Actual Signal Display mode. Otherwise the LED bar of the Inverter Monitoring Display display will show an incorrect value. The ISXR73XX panel link ID number must be 1, see *How to select a control unit and change its panel link ID number*.		
18.01	LED PANEL OUTPUT		Selects the signal source for the Inverter Monitoring Display. Example: To show signal *01.09 POWER* on the display, set this parameter to 109.	109	I
	0…30000		Parameter index 109 denotes signal *01.09 POWER*.		
18.02	SCALE PANEL		Defines the value of the signal selected by parameter *18.01* LED PANEL OUTPUT which corresponds to 100% on the LED bar display. Example: Signal *01.05 FREQUENCY* is shown on the LED display: At 50 Hz the LED display indicates full value (100%) when: Parameter *18.01* is set to 105. Parameter *18.02* is set to 5000 (= 100 · 50 = 5000, where 100 is the integer scale (FbEq) for signal 01.05).	100	R
	0…65536	1 = 1	Scaling factor		
24 REACTIVE POWER			Reactive power compensation		
24.01	Q POWER REF		Defines the reference value for the reactive power generation. The inverter can generate reactive power to the supply network. See also parameter *24.02 Q POWER REF2*.	0%	R
	-100…+100%	100 = 1%	Reactive power in percent of the inverter nominal power (signal *04.06 CONV NOM POWER*). Positive value denotes capacitive load. Negative value denotes inductive load.		
24.02	Q POWER REF2		Defines the reference for the reactive power generation written into parameter *24.01 Q POWER REF*. The reference unit is selected by parameter *24.03 Q POWER REF2 SEL*. **Note:** Parameter *11.02 Q REF SELECT* must be set to *PARAM 24.02*.	0	I
	-32768….32767 (equals -327.68…327.67%)	1 = 1	Reference value Example: When parameter *24.03 Q POWER REF2 SEL* is set to *PERCENT*, value 10000 of parameter *24.02 Q POWER REF2* equals to value 100% of parameter *24.01 Q POWER REF* (ie, 100% of the converter nominal power given in signal *04.06 CONV NOM POWER*).		
	-32768….32767 (equals -32768…32767 kVAr)	1 = 1	Reference value Example: When parameter *24.03 Q POWER REF2 SEL* is set to *kVAr*, value 1000 of parameter *24.02 Q POWER REF2* equals to parameter *24.01 Q POWER REF* value calculated with the following equation: 100 × (1000 kVAr divided by inverter nominal power in kVAr)%.		

No.	Name/Value	FbEq	Description	Def.	T
	-3000…3000 (equals -30…30 deg)	1 = 1	Reference value Example: When parameter *24.03 Q POWER REF2 SEL* is set to *PHI*, value 3000 of parameter *24.02 Q POWER REF2* equals approximately to parameter *24.01 Q POWER REF* value calculated with the following equation (where P is read from actual signal *01.09 POWER*): $\cos(\varphi) = \frac{P}{S} = \frac{P}{\sqrt{P^2 + Q^2}}$  Positive reference denotes capacitive load. Negative reference denotes inductive load. Parameter *24.02* values are converted to degrees by the control program: -3000…3000 ≙ -30°…30°. Values above 3000 or below -3000 equal to -30°/30°, since the range is limited to -3000/3000.		
	-8500…-9999 (equals -0.86…-0.9999) and 8500…10000 (equals 0.86…1.0000)	1 = 1	Reference value when parameter *24.03 Q POWER REF2 SEL* is set to *COSPHI*. Positive reference denotes capacitive load. Negative reference denotes inductive load.		
	-10000…10000 (equals -100…100% of *04.05 CONV NOM CURRENT*)	1 = 1	Reference value when parameter *24.03 Q POWER REF2 SEL* is set to *IQ REF*.  See also parameters *24.18*…*24.19*.		
	9000…10000…11000 (equals 90…100…110% of *04.04 CONV NOM VOLTAGE*)	1 = 1	Defines the nominal voltage (ie, the voltage when the reactive power reference is zero) when parameter *24.03 Q POWER REF2 SEL* is set to *AC REF*.  See also parameters *24.25*…*24.28*.		

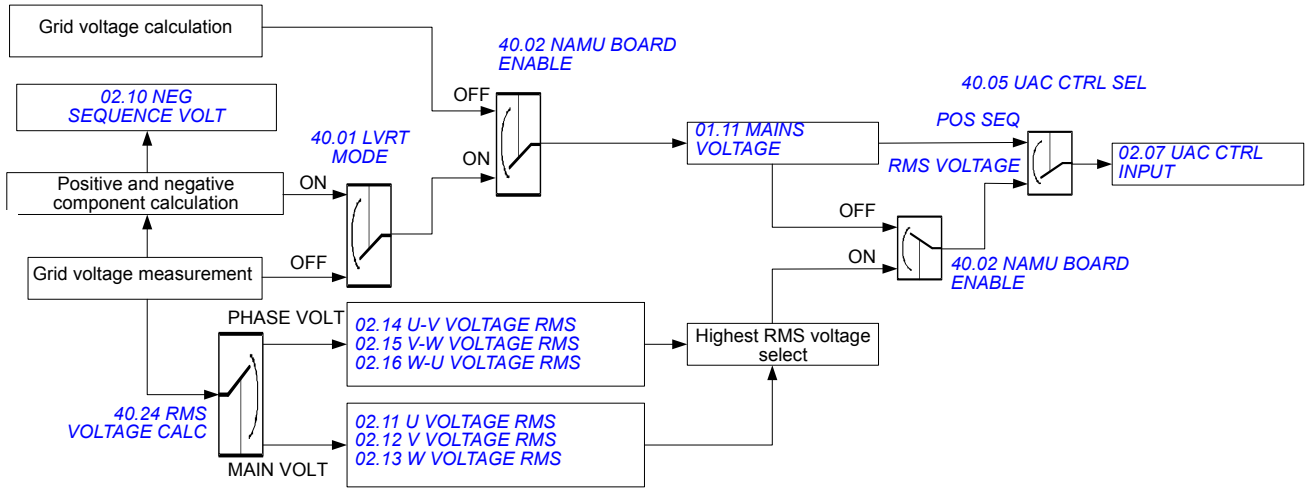
No.	Name/Value	FbEq	Description	Def.	T
24.03	Q POWER REF2 SEL		Selects the reference unit. See parameter *24.02 Q POWER REF2*.	kVAr	I
	PERCENT	1	In percent of the nominal power		
	kVAr	2	kvar		
	PHI	3	angle φ		
	COSPHI	4	Cosφ		
	IQ REF	5	Reactive current reference selection		
	AC REF	6	AC voltage control reference selection		
	Q(U) REF	7	Q(U) control reference selection		
24.04	Q POWER REF ADD		Adds a defined value to *24.02 Q POWER REF2*.	0 kVAr	R
	-30000…30000 kVAr	1 = 1 kVAr			
24.15	AC-CTR GAIN		Defines the relative gain of the AC voltage controller. For example, if the gain is set to 1, a 10% change in the error value (reference - actual value) causes the AC voltage controller output to change by 10%.	2	R
	0…32767	1 = 1	AC voltage controller gain.		
24.16	AC-CTR INTEG TIME		Defines the integration time of the AC voltage controller.	1 s	R
	0…32767 s	1 = 1 s	AC voltage controller integration time.		
24.17	AC-CTR OFFSET		Defines an offset value that can be used to manipulate the U_{AC} reference input. The offset is added to the reference given by the user. With zero offset, the reference range 9000…10000…11000 corresponds to 90…100…110% of nominal voltage. With an offset of 1000, the reference range 8000…9000…10000 corresponds to 90…100…110% of nominal voltage.	0	I
	-32768…32767	1 = 1	AC voltage controller offset.		
24.18	AC-CTR LOW LIMIT		Low limit for final reactive power reference. The range of -10000…0 corresponds to -100%…0.	-10000	I
	-10000…0	1 = 1	Low limit for reactive power reference.		
24.19	AC-CTR HIGH LIMIT		High limit for final reactive power reference. The range of 0…10000 corresponds to 0…+100%.	10000	I
	0…10000	1 = 1	High limit for reactive power reference.		
24.22	IQ CAP LIMIT		Capacitive current reference limit. If the capacitive current reference is higher than this limit, bit 2 of *08.03 LIMIT WORD* is set. **Note:** An active reduced run function rescales the limit.	100%	R
	0…200%	1 = 1%	Capacitive current reference limit in percent of *04.05 CONV NOM CURRENT*.		
24.23	IQ IND LIMIT		Inductive current reference limit. If the inductive current reference is higher than this limit, bit 3 of *08.03 LIMIT WORD* is set. **Note:** An active reduced run function rescales the limit.	100%	R
	0…200%	1 = 1%	Inductive current reference limit in percent of *04.05 CONV NOM CURRENT*.		
24.24	AC REF EXT DIP		AC voltage controller reference upon an extended dip.	90%	R
	60…110%	100 = 1%	AC voltage reference in percent of *04.04 CONV NOM VOLTAGE*.		

No.	Name/Value	FbEq	Description	Def.	T
24.25	Q(U) SLOPE	100 = 1 %/V	Defines the slope for Q(U) control reference calculation. If the grid voltage differs from the nominal value defined by parameter *24.02 Q POWER REF2*, then Q(U) control feeds reactive power. Amount of reactive power can be defined from the formula below: 24.25 Q(U) SLOPE x UAC change If UAC is less than nominal, capacitive power is generated. If UAC is above nominal, inductive power is generated. See also parameters *24.02*, *24.26*...*24.28*.	4.17%/V	R
	0…20 %/V		Q(U) slope		
24.26	Q(U) HYSTERESIS	100 = 1 V	Defines hysteresis for Q(U) control. If the grid voltage stays inside the hysteresis area, Q(U) control is not active.	0 V	R
	0…100 V		Voltage hysteresis		
24.27	Q(U) TIME DELAY	100 = 1 s	Defines the time delay for Q(U) control. Q(U) control is active when the grid voltage has been outside the hysteresis area longer that the delay time.	0 s	R
	0…3600 s		Time delay		
24.28	Q(U) RAMP TIME		Defines a ramp time for Q(U) control. Actual grid voltage is ramped before using it in Q(U) control.	62.5 s	
	0…3600 s		Ramp time from zero to nominal voltage		
30 FAULT FUNCTIONS			Programmable protection functions		
30.02	EARTH FAULT		Selects the action when a ground (earth) fault or current unbalance is detected. **Note:** With parallel-connected modules, *30.02 EARTH FAULT* is forced to *FAULT* and the fault message is *CUR UNBAL 1 (23E0)*… instead of *EARTH FAULT (2330)*.	FAULT	B
	WARNING	0	The inverter generates alarm *EARTH FAULT (2387)*.		
	FAULT	1	The inverter trips on fault *EARTH FAULT (2330)* / *CUR UNBAL 1 (23E0)*….		
30.03	EARTH FAULT LEVEL		Defines the ground (earth) fault level. **Note:** This parameter cannot be changed without a valid pass code. Contact your local ABB representative.	3	R
	1	1	1% unbalance in the sum current		
	2	2	3% unbalance in the sum current		
	3	3	8% unbalance in the sum current		
	4	4	13% unbalance in the sum current		
	5	5	18% unbalance in the sum current		
	6	6	28% unbalance in the sum current		
	7	7	39% unbalance in the sum current		
	8	8	62% unbalance in the sum current		

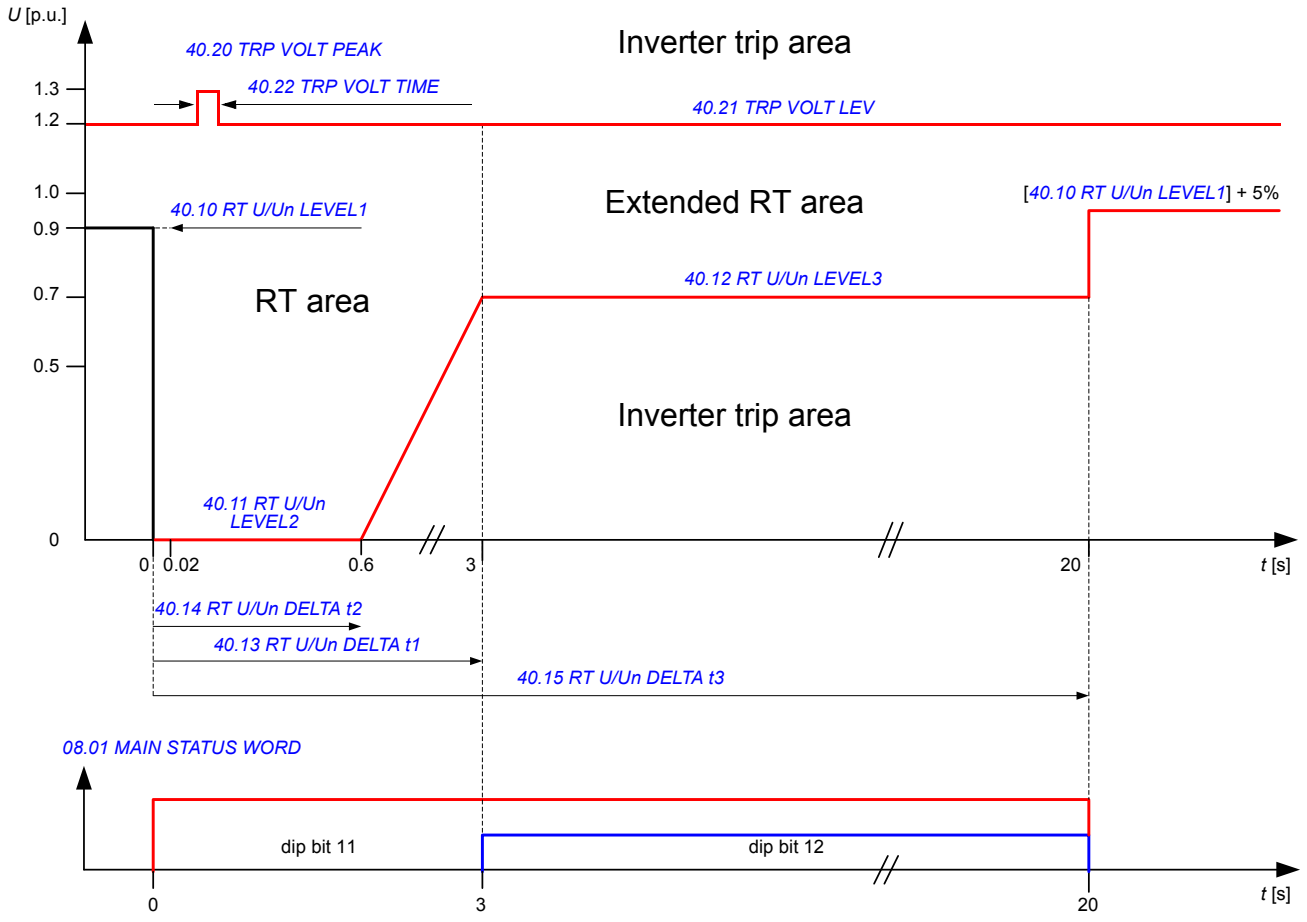
No.	Name/Value	FbEq	Description	Def.	T
30.04	DI4 EXT EVENT		Selects how the inverter reacts to the state of digital input DI4. **Note:** DI4 is reserved for ground/earth fault monitoring.	DI4=1 FAULTS	I
	NO	1	Not in use.		
	DI4=0 FAULTS	2	If digital input DI4 is OFF (0), the inverter trips on fault *EXT EVENT DI4 (9084)*.		
	DI4=1 FAULTS	3	If digital input DI4 is ON (1), the inverter trips on fault *EXT EVENT DI4 (9084)*.		
	DI4=0 ALARMS	4	If digital input DI4 is OFF (0), the inverter generates warning *EXT EVNT DI4 (908B)*.		
	DI4=1 ALARMS	5	If digital input DI4 is ON (1), the inverter generates warning *EXT EVNT DI4 (908B)*.		
	DI4=1 RESTART	6	If digital input DI4 is ON (1), relay output RO2 is used to reset an external ground/earth fault monitoring device. This is done five times at 60-second intervals. During this, the alarm *DI4 RESTR ALM (907B)* is generated. If DI4 is still ON, the inverter trips on a *DI4 RESTR FLT (9074)* fault. **Note:** This setting overrides parameter *14.04 DO2 GROUP+INDEX*.		
30.05	DI5 EXT EVENT		Selects how the inverter reacts to the state of digital input DI5. **Note:** DI5 is reserved for cabinet temperature monitoring.	NO	I
	NO	1	Not in use		
	DI5 = 0 FAULTS	2	If digital input DI5 is OFF (0), the inverter first generates alarm *EXT EVNT DI5 (908C)* and trips on fault *EXT EVENT DI5 (9085)* after the delay defined by parameter *30.10 DI5 TRIP DELAY* has elapsed.		
	DI5 = 1 FAULTS	3	If digital input DI5 is ON (1), the inverter first generates alarm *EXT EVNT DI5 (908C)* and trips on fault *EXT EVENT DI5 (9085)* after the delay defined by parameter *30.10 DI5 TRIP DELAY* has elapsed.		
	DI5 = 0 ALARMS	4	If digital input DI5 is OFF (0), the inverter generates alarm *EXT EVNT DI5 (908C)*.		
	DI5 = 1 ALARMS	5	If digital input DI5 is ON (1), the inverter generates alarm *EXT EVNT DI5 (908C)*.		
30.10	DI5 TRIP DELAY		Defines the delay time before the inverter trips on fault *EXT EVENT DI5 (9085)*. Supervision is selected by parameter *30.05 DI5 EXT EVENT*. The default value is 0 s with 100 kW inverters, 60 s with 250 and 500 kW inverters.	0 s	R
	0…3600 s	1 = 1	Delay time		
30.11	DC OVERVOLT TRIP		Defines the *DC OVERVOLT (3210)* (DC circuit overvoltage fault) trip limit. In MPPT control, the range is as defined in section *Operation voltages*. At start, 1000 V is allowed for a short period.	1000 V	R
	[*30.12*] … [*04.07*] V	1 = 1 V	Trip limit		
30.12	DC UNDERVOLT TRIP		Defines the *DC UNDERVOLT (3220)* (DC circuit undervoltage fault) trip limit. **Note:** This parameter also determines the DC voltage check limit during charging.	212 V	R
	0…*30.11* V	1 = 1 V	Trip limit		

No.	Name/Value	FbEq	Description	Def.	T
30.13	DI7 EXT EVENT		Selects how inverter reacts to the state of digital input DI7 (DIIL). See parameter *16.01 RUN BIT SEL*.	NO	I
	NO	1	Not in use		
	DI7=0 FAULTS	2	If digital input DI7 is OFF (0), the inverter first generates warning *EXT EVNT DI7 (908E)* and then trips on fault *EXT EVENT DI7 (9087)* after the delay defined by parameter *30.14 DI7 TRIP DELAY* has elapsed.		
	DI7=1 FAULTS	3	If digital input DI7 is ON (1), the inverter first generates warning *EXT EVNT DI7 (908E)* and then trips on fault *EXT EVENT DI7 (9087)* after the delay defined by parameter *30.14 DI7 TRIP DELAY* has elapsed.		
	DI7=0 ALARMS	4	If digital input DI7 is OFF (0), the inverter generates warning *EXT EVNT DI7 (908E)*.		
	DI7=1 ALARMS	5	If digital input DI7 is ON (1), the inverter generates warning *EXT EVNT DI7 (908E)*.		
30.14	DI7 TRIP DELAY		Defines the delay time before the inverter trips on fault *EXT EVENT DI7 (9087)*. Supervision is selected by parameter *30.13 DI7 EXT EVENT*.	0 s	R
	0…3600 s	1 = 1	Delay time		
30.15	DCREF RANGE ALARM		When MPPT hits the minimum or maximum range of the DC reference, an alarm can be triggered. Otherwise just status bits are updated in parameter *08.06 MPPT STATUS*.	OFF	B
	OFF	0	No alarm. If the minimum range is reached, bit 8 is set in parameter *08.06 MPPT STATUS*. If the maximum range is reached, bit 9 is set in parameter *08.06 MPPT STATUS*.		
	ON	1	Alarm is triggered if MPPT reaches the minimum or maximum range of the DC reference. If the minimum range is reached, bit 8 in parameter *08.06 MPPT STATUS* and bit 12 in parameter *09.10 PV FLT ALM WORD* are set. Alarm: *DCREF MIN RNG (32AB)*. If the maximum range is reached, bit 9 in parameter *08.06 MPPT STATUS* and bit 13 in parameter *09.10 PV FLT ALM WORD* are set. Alarm: *DCREF MAX RNG (32AC)*.		
39 MPPT CONTROL			Maximum power point tracking (MPPT) settings. See also section *Maximum power point tracking (MPPT)* on page *32*.		
39.01	MPPT CONTROL		Enables/disables MPPT.	ON	B
	OFF	0	MPPT disabled.		
	ON	1	MPPT enabled.		
39.02	MPPT UDC STEP		Defines the DC voltage steps that is used by the MPPT logic when seeking the maximum power point.	7 V	R
	0 … [*04.07*] V	10 = 1 V	DC voltage step.		
39.04	MPPT DC REF MAX		Maximum DC reference value allowed for MPPT.	825 V	R
	[*39.05*] … 800 V	1 = 1 V	Maximum DC reference.		
39.05	MPPT DC REF MIN		Minimum DC reference value allowed for MPPT.	Varies	R
	0.65 × $\sqrt{2}$ × [*04.07*] … [*39.04*] V	1 = 1 V	Minimum DC reference.		

No.	Name/Value	FbEq	Description	Def.	T
39.06	GRIDMON SUPV MODE		Determines the action when a grid failure is detected by the grid monitoring relay.	FAULT	I
	NONE	0	No action taken.		
	ALARM	1	An alarm is given.		
	FAULT	2	A fault is generated.		
	RESTART	3	An alarm is given, the delay specified by parameter *39.07 GRIDMON RESTR DLY* starts. The inverter is restarted after the delay elapses. If the fault still exists, restart is attempted after another delay period. The cycle is repeated until the fault is removed.		
39.07	GRIDMON RESTR DLY		When parameter *39.06 GRIDMON SUPV MODE* is set to *RESTART*, determines the delay before a restart is attempted.	0 ms	R
	0…8388607 ms	1 = 1 ms	Restart delay.		
39.08	ENA EXT DC REF		Enables/disables external DC reference. When enabled, the external reference overrides the internal MPPT reference. See master control program parameter *23.01 EXT MPPT DC REF* (page *65*).	OFF	B
	OFF	0	External DC reference disabled. Internal MPPT reference used.		
	ON	1	External DC reference enabled. The external reference overrides the internal MPPT reference.		
39.09	EXT MPPT DC REF		Shows the external DC reference. This reference is used when parameter *39.08 ENA EXT DC REF* is set to *ON*.	0 V	B
	0…1500	1 = 1 V	External DC reference.		
40 LVRT CONTROL			Parameters related to the low voltage ride-through function. Do not change parameters when the PVS800 is running. **Note:** Group 40 is write-protected. It can be write-enabled by giving a password with parameter *16.03 PASS CODE*.		
40.01	LVRT MODE		Voltage tracking source selection for the low voltage ride-through function. Selection between phase and main voltages can be set in parameter *40.24 RMS VOLTAGE CALC*. **Note:** Parameter 40.01 LVRT MODE is write-protected when the PVS800 is running. Stop the PVS800 before changing the value. **Note:** Perform the following checks before enabling the LVRT function: • Check that the mains voltage measurement is OK (signal *01.11 MAINS VOLTAGE*). • Check that the RT area parameters are set correctly, see the figure of parameter *40.10 RT U/Un LEVEL1*. • Check the settings for the grid support mode (parameter *41.01 GRID SUPPORT MODE*).	OFF	I
	OFF	0	Low voltage ride-trough function is disabled.		
	MAX RMS VOLT	1	Input for the LVRT function is the highest RMS AC voltage, either phase or main.		
	MIN RMS VOLT	2	Input for the LVRT function is the lowest RMS AC voltage, either phase or main.		
	POS SEQ VOLT	3	Input for the LVRT function is the positive sequence of the AC voltage.		

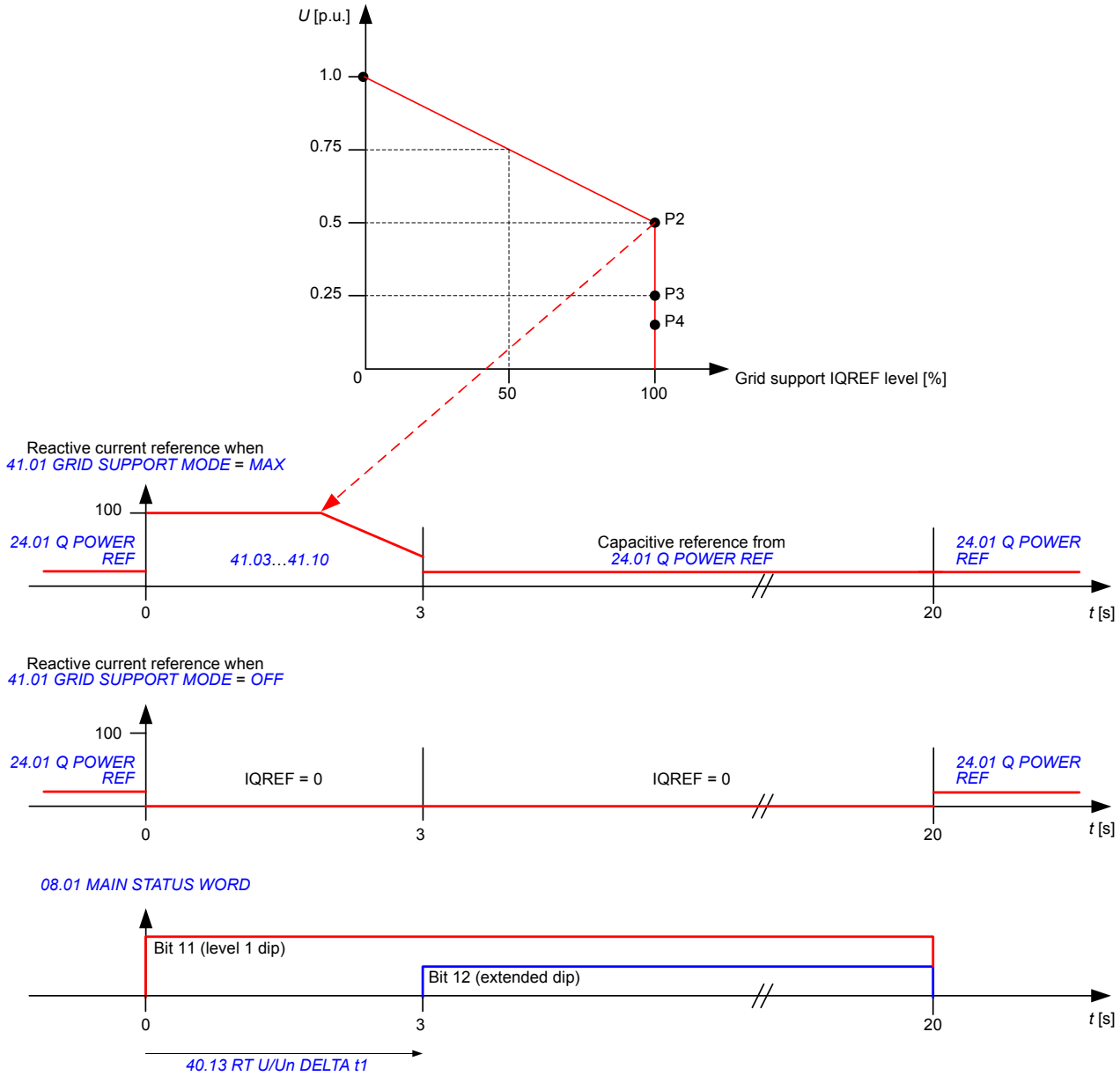
<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>Def.</th><th>T</th></tr>
<tr><td>40.02</td><td>NAMU BOARD ENABLE</td><td></td><td>Enables the NAMU grid voltage measuring board. If the signal 01.11 MAINS VOLTAGE is correct or the fault LED on the NAMU board is not blinking, the communication between the NAMU board and the inverter control unit is OK. If the communication fails, the CH2 COM LOST (7520) fault appears.
Note: The line side ID run must be done without the NAMU board, therefore set parameter 40.02 NAMU BOARD ENABLE to OFF during the ID run and after a successful ID run (the PVS800 goes into the MPPT state), set parameter 40.02 to ON again. To disable the ID run, set parameter 99.08 AUTO LINE ID RUN to NO.
Note: When parameter 40.02 NAMU BOARD ENABLE is set to OFF, the following parameters are also disabled and must be set to ON again if the NAMU board is enabled and the functions below are needed:
• 40.01 LVRT MODE (OFF)
• 40.24 RMS VOLTAGE CALC (OFF).</td><td>OFF</td><td>B</td></tr>
<tr><td></td><td>OFF</td><td>0</td><td>Communication to the NAMU board is disabled.</td><td></td><td></td></tr>
<tr><td></td><td>ON</td><td>1</td><td>Communication to the NAMU board is enabled.</td><td></td><td></td></tr>
<tr><td>40.05</td><td>UAC CTRL SEL</td><td></td><td>Selects the source for parameter 02.17 UAC CTRL INPUT.</td><td>RMS VOLTAGE</td><td>I</td></tr>
<tr><td></td><td>POS SEQ</td><td>0</td><td><table><tr><th>01.11 MAINS VOLTAGE</th><th>40.01</th><th>40.02</th></tr><tr><td>positive component</td><td>ON</td><td>ON</td></tr><tr><td>measured</td><td>OFF</td><td>ON</td></tr><tr><td>estimated</td><td>OFF</td><td>OFF</td></tr></table></td><td></td><td></td></tr>
<tr><td></td><td>RMS VOLTAGE</td><td>1</td><td>Highest RMS voltage if 40.02 NAMU BOARD ENABLE is activated.
Note: Parameter 01.11 MAINS VOLTAGE is used if 40.02 NAMU BOARD ENABLE is set to OFF.</td><td></td><td></td></tr>
<tr><td colspan="6"> 
</td></tr>
<tr><td>40.09</td><td>RT U/Un MOD STOP</td><td>1 = 1%</td><td>Modulation stops if the value of 01.11 MAINS VOLTAGE falls below the value of this parameter. Check the RT area parameters. See the figure at parameter 40.10 RT U/Un LEVEL1.</td><td>0%</td><td>R</td></tr>
<tr><td></td><td>0…90%</td><td></td><td>Modulation stop limit of the RT function.</td><td></td><td></td></tr>
</table>

No.	Name/Value	FbEq	Description	Def.	T
40.10	RT U/Un LEVEL1	1 = 1%	Defines the trigger level for the RT function. See the figure below for information on defining the allowable RT area. After the RT function has been triggered, bit 11 of *08.01 MAIN STATUS WORD* is set and an alarm (*LVRT RIDETRGH (32A0)*) is generated. After the time delay defined by *40.13 RT U/Un DELTA t1* has elapsed, bit 12 of *08.01 MAIN STATUS WORD* is set. If the grid transient lasts longer than defined by time parameters, the inverter unit will trip on *RT NET LOST (32A1)*.	90%	R
	[*40.11*]…200%		Level 1		

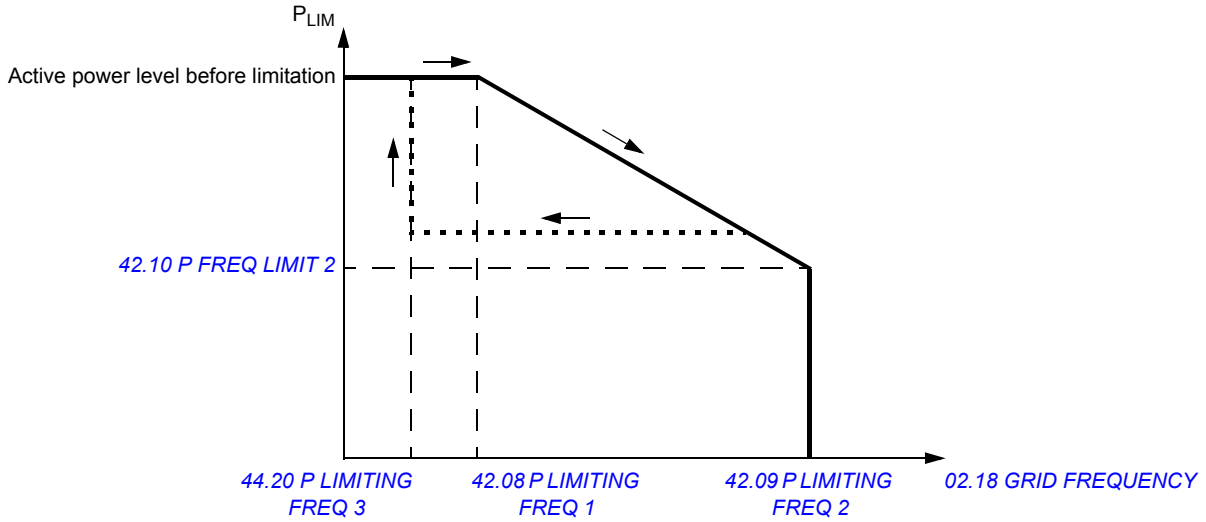


40.11	RT U/Un LEVEL2	1 = 1%	RT area level 2. See the figure in parameter *41.10 RT U/Un LEVEL1*.	0%	R
	0…[*40.10*]%		Level 2		
40.12	RT U/Un LEVEL3	1 = 1%	Level 3 of the extended RT area. See the figure in parameter *41.10 RT U/Un LEVEL1*.	70%	R
	[*40.11*]…200%		Level 3		
40.13	RT U/Un DELTA t1	1 = 1 ms	Defines the time (t1) within which *01.11 MAINS VOLTAGE* should be restored above *40.12 RT U/Un LEVEL3*. Defines the start time of the extended RT area.	3000 ms	R
	[*40.14*]…8388608 ms		Time 1		
40.14	RT U/Un DELTA t2	1 = 1 ms	Defines the time (t2) when the *RT NET LOST (32A1)* trip limit starts to rise from level 2 to level 3.	600 ms	R
	0…[*40.13*] ms		Time 2		

<table>
<tr><th>No.</th><th>Name/Value</th><th>FbEq</th><th>Description</th><th>Def.</th><th>T</th></tr>
<tr><td>40.15</td><td>RT U/Un DELTA t3</td><td>1 = 1 ms</td><td>Defines the end time (t3) of the extended RT area. Fault RT NET LOST (32A1) is generated if 01.11 MAINS VOLTAGE has not returned above [40.10 RT U/Un LEVEL1] + 5%.</td><td>20000 ms</td><td>R</td></tr>
<tr><td></td><td>[40.13]…8388608 ms</td><td></td><td>Time 3</td><td></td><td></td></tr>
<tr><td>40.20</td><td>TRP VOLT PEAK</td><td>1 = 1%</td><td>Instant trip level for high grid voltage. If the level is exceeded, the fault HIGH UAC PEAK (32A4) is generated.</td><td>130%</td><td>R</td></tr>
<tr><td></td><td>0…200%</td><td></td><td>Peak trip level</td><td></td><td></td></tr>
<tr><td>40.21</td><td>TRP VOLT LEV</td><td>1 = 1%</td><td>Trip level for high grid voltage level. If the voltage remains above this level for longer than the time defined by 40.22 TRP VOLT TIME, the fault HIGH UAC LEV (32A5) is generated.</td><td>120%</td><td>R</td></tr>
<tr><td></td><td>0…[40.20]%</td><td></td><td>Trip level</td><td></td><td></td></tr>
<tr><td>40.22</td><td>TRP VOLT TIME</td><td>1 = 1 ms</td><td>Defines the time for high voltage level monitoring (parameter 40.21 TRP VOLT LEV).</td><td>20 ms</td><td>R</td></tr>
<tr><td></td><td>0…8388608 ms</td><td></td><td>Time for high voltage level monitoring</td><td></td><td></td></tr>
<tr><td>40.23</td><td>TRP VOLT SEL</td><td></td><td>Defines the source for high grid voltage monitoring.</td><td>RMS VOLTAGE</td><td>R</td></tr>
<tr><td></td><td>POS SEQ</td><td>0</td><td><table><tr><th>01.11 MAINS VOLTAGE</th><th>40.01</th><th>40.02</th></tr><tr><td>positive component</td><td>ON</td><td>ON</td></tr><tr><td>measured</td><td>OFF</td><td>ON</td></tr><tr><td>estimated</td><td>OFF</td><td>OFF</td></tr></table></td><td></td><td></td></tr>
<tr><td></td><td>RMS VOLTAGE</td><td>1</td><td>Highest RMS voltage if 40.02 NAMU BOARD ENABLE is set to ON.
Note: Parameter 01.11 MAINS VOLTAGE is used if 40.02 NAMU BOARD ENABLE is set to OFF.</td><td></td><td></td></tr>
<tr><td>40.24</td><td>RMS VOLTAGE CALC</td><td></td><td>Enables/disables RMS voltage measuring.</td><td>OFF</td><td>B</td></tr>
<tr><td></td><td>OFF</td><td>0</td><td>RMS voltage measuring is disabled.</td><td></td><td></td></tr>
<tr><td></td><td>PHASE VOLT</td><td>1</td><td>RMS phase voltage measuring is enabled.</td><td></td><td></td></tr>
<tr><td></td><td>MAIN VOLT</td><td>2</td><td>RMS main voltage measuring is enabled.</td><td></td><td></td></tr>
<tr><td colspan="3">41 GRID SUPPORT</td><td>Parameters related to grid support function.
Note: Group 41 is write-protected. It can be write-enabled by giving a password with parameter 16.03 PASS CODE. Parameter 41.01 GRID SUPPORT MODE is write-protected when the PVS800 is running.</td><td></td><td></td></tr>
<tr><td>41.01</td><td>GRID SUPPORT MODE</td><td></td><td>Operation mode selection for grid support function. Grid support means feeding of capacitive reactive power to the grid upon normal voltage dip (ie, when bit 11 of 08.01 MAIN STATUS WORD is set but bit 12 is clear). The amount of grid support is defined by parameters 41.03…41.10.
Selection between phase and main voltages can be set in parameter 40.24 RMS VOLTAGE CALC.</td><td>OFF</td><td>I</td></tr>
</table>

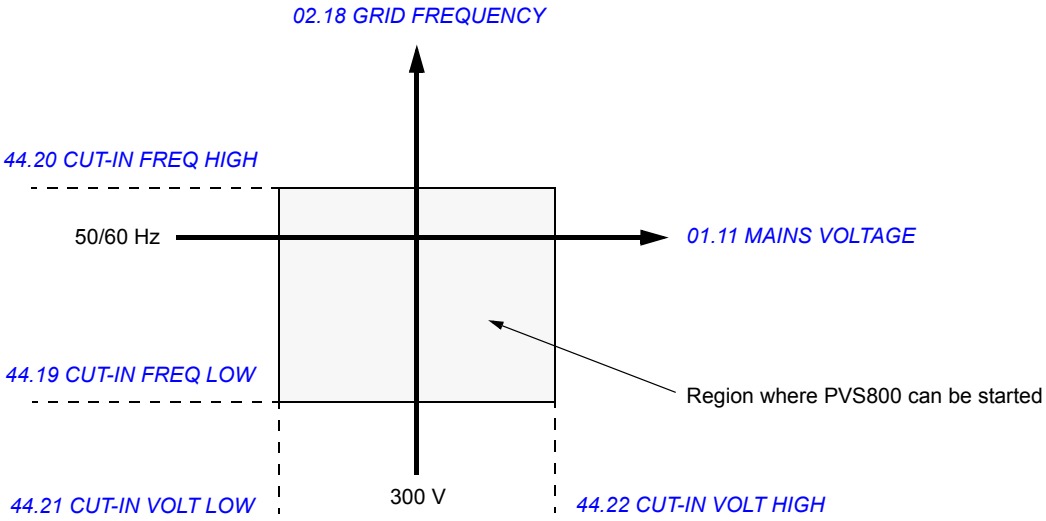
No.	Name/Value	FbEq	Description	Def.	T
					
	OFF	0	Grid support function is disabled.		
	MAX RMS VOLT	1	Input for the grid support function is the highest RMS AC voltage, either phase or main.		
	MIN RMS VOLT	2	Input for the grid support function is the lowest RMS AC voltage, either phase or main.		
	POS SEQ VOLT	3	Input for the grid support function is a positive sequence of the AC voltage.		
41.03	GS U/Un LEVEL 1		Defines grid support level 1. When the voltage falls below this level, the grid is supported by feeding capacitive current as defined by *41.07 GS IQREF LEVEL 1*.	100%	R
	[*41.04*]…200%	1 = 1%	Grid support voltage level 1.		
41.04	GS U/Un LEVEL 2		Defines grid support level 2. When the voltage falls below this level, the grid is supported by feeding capacitive current as defined by *41.08 GS IQREF LEVEL 2*.	50%	R
	[*41.05*]…[*41.03*]%	1 = 1%	Grid support voltage level 2.		

No.	Name/Value	FbEq	Description	Def.	T
41.05	GS U/Un LEVEL 3		Defines grid support level 3. When the voltage falls below this level, the grid is supported by feeding capacitive current as defined by *41.09 GS IQREF LEVEL 3*.	25%	R
	[*41.06*]…[*41.04*]%	1 = 1%	Grid support voltage level 3.		
41.06	GS U/Un LEVEL 4		Defines grid support level 4. When the voltage falls below this level, the grid is supported by feeding capacitive current as defined by *41.10 GS IQREF LEVEL 4*.	15%	R
	0…[*41.05*]%	1 = 1%	Grid support voltage level 4.		
41.07	GS IQREF LEVEL 1		Defines the reactive current reference point for *41.03 GS U/Un LEVEL 1* in percent of *04.05 CONV NOM CURRENT*.	0%	R
	0…100%	1 = 1%	Grid support reference level 1.		
41.08	GS IQREF LEVEL 2		Defines the reactive current reference point for *41.04 GS U/Un LEVEL 2* in percent of *04.05 CONV NOM CURRENT*.	100%	R
	0…100%	1 = 1%	Grid support reference level 2.		
41.09	GS IQREF LEVEL 3		Defines the reactive current reference point for *41.05 GS U/Un LEVEL 3* in percent of *04.05 CONV NOM CURRENT*.	100%	R
	0…100%	1 = 1%	Grid support reference level 3.		
41.10	GS IQREF LEVEL 4		Defines the reactive current reference point for *41.06 GS U/Un LEVEL 4* in percent of *04.05 CONV NOM CURRENT*.	100%	R
	0…100%	1 = 1%	Grid support reference level 4.		
41.11	RT IQREF	1 = 1%	Defines an external reactive current reference during a voltage dip. If the value differs from 0, the reactive current reference defined by parameters *41.03*…*40.10* is bypassed. Value is given as a percentage of parameter *04.05 CONV NOM CURRENT*.	0%	R
	0…100%		Reactive current reference		
41.12	RT IQ RAMP UP	10 = 1 s	Defines the ramp time from zero to nominal current (*04.05 CONV NOM CURRENT*) for the reactive current reference. Ramp time is used if parameter *40.01 LVRT MODE* is activated and the voltage dip is active.	0.04 s	R
	0…100 s		Ramp time		
42 GENER POWER LIMIT			Parameters related to generated active power limiting. **Note:** Group 42 is write-protected when the PVS800 is running. It is write-enabled when the inverter has been stopped and a password given with parameter *16.03 PASS CODE*.		
42.02	GENLIM RAMP UP	10 = 1 s	Ramp up time for the generator side power limit.	3 s	R
42.03	ACTPOW RAMP UP	10 = 1 s	Active power ramp up time from zero to *04.06 CONV NOM POWER*.	10 s	R
42.04	ACTPOW RAMP DOWN		Active power ramp down time from zero to *04.06 CONV NOM POWER*.	10 s	R
42.05	RESTR ACTPOW GRD1		Ramping time in seconds for active power from zero to *04.06 CONV NOM POWER* after the following network faults: RT NET LOST (32A1) 9.11 SUPPLY FAULT WORD bit 9 GRID MON FLT (8189) 9.10 PV FLT ALM WORD bit 0 AC UNDERFREQ (3142) 9.01 FAULT WORD 1 bit 8 AC OVERFREQ (3141) 9.01 FAULT WORD 1 bit 9 AC UNDERVOLT (3120) 9.01 FAULT WORD 1 bit 10 AC OVERVOLT (3110) 9.01 FAULT WORD 1 bit 11	0 s	R
42.06	RESTR ACTPOW GRD2		Ramping time in seconds for active power from 0 kW to nominal after all other faults not listed in parameter *42.05 RESTR ACTPOW GRD1* or after a stop.	0 s	R

No.	Name/Value	FbEq	Description	Def.	T
42.07	P FREQ LIM ENA		Enables or disables the prevailing, grid frequency -based active power limitation. Power limitation curve can be adjusted with parameters *42.08 P LIMITING FREQ 1*, *42.09 P LIMITING FREQ 2* and *42.10 P FREQ LIMIT 2*. When the frequency-based power limitation is limiting power, the grid frequency must recover to a value that is below *44.20 CUT-IN FREQ HIGH* before the active power can be increased back to the prevailing power. See the arrows in the figure below.	OFF	I
	OFF	0	Power limitation is disabled.		
	ON	1	Power limitation is enabled.		
					
42.08	P LIMITING FREQ 1	100 = 1 Hz	Defines the grid frequency where the active power limitation starts.	50.2 Hz	R
	[41.11] … [41.09]		Start frequency for the active power limitation.		
42.09	P LIMITING FREQ 2		Defines the grid frequency where the active power limitation curve ends. If the grid frequency exceeds this value, the active power is limited to zero. **Note:** The value of this setting must be greater than *42.08 P LIMITING FREQ 1*.	51.5 Hz	R
	[41.08] … 65 Hz		Stop frequency for the active power limitation.		
42.10	P FREQ LIMIT 2	100 = 1%	Defines the active power limitation at the frequency defined by parameter *42.09 P LIMITING FREQ 2*. Value is given as a percentage of the active power level before limitation.	48%	R
	0…100%		Active power limitation.		
42.11	P LIMITING FREQ 3	100 = 1 Hz	Defines the frequency when power limitation from grid frequency is deactivated. If frequency dependent active power limitation is effective (bit 8 in parameter *08.03 LIMIT WORD* is set), it is deactivated only when *02.18 GRID FREQUENCY* falls below 42.11 P LIMITING FREQ 3.	50.05	R
	45…65 Hz				
42.12	POWER PRIORITY		Defines the prioritized power type. If the AC current limit of the inverter is reached, the non-prioritized power type is reduced to keep the AC current below the limit.	ACTIVE POW	I
	REACTIVE POW	0	Reactive power is prioritized and the active power is limited.		
	ACTIVE POW	1	Active power is prioritized and the reactive current reference is limited.		

No.	Name/Value	FbEq	Description	Def.	T
44 GRID MONITORING			Parameters related to internal grid monitoring. **Note:** Group 44 is write-protected. It can be write-enabled by giving a password with parameter *16.03 PASS CODE*.		
44.01	NAMU GRIDMON MODE		Defines the usage mode of the internal grid monitoring. Grid monitoring is based on the voltage measurement via the NAMU board.	FAULT	I
	NONE	0	Internal grid monitoring is disabled.		
	ALARM	1	Internal grid monitoring is enabled. If grid voltage and/or frequency are outside limits that are defined by parameters *44.02*…*44.17*, a corresponding alarm is created and the inverter continues to operate.		
	FAULT	2	Internal grid monitoring is enabled. If grid voltage and/or frequency are outside limits that are defined by parameters *44.02*…*44.17*, a corresponding fault is created and the inverter stops.		
44.02	UNDER FREQ 1 LIM	100 = 1 Hz	Defines a trip limit for under frequency fault 1. If the grid frequency (signal *02.18 GRID FREQUENCY*) is below this setting longer than the time delay in parameter *44.04 UNDER FREQ 1 TIME*, the inverter will generate an alarm or a fault according to parameter *44.01 NAMU GRIDMON MODE*.	47.5 Hz	R
	45…65 Hz		Trip limit 1		
44.03	UNDER FREQ 2 LIM	100 = 1 Hz	Defines a trip limit for under frequency fault 2. If the grid frequency (signal *02.18 GRID FREQUENCY*) is below this setting longer than time delay in parameter *44.05 UNDER FREQ 2 TIME*, the inverter will generate an alarm or a fault according to parameter *44.01 NAMU GRIDMON MODE*.	47.5 Hz	R
	45…65 Hz		Trip limit 2		
44.04	UNDER FREQ 1 TIME	100 = 1 s	Defines a trip time for under frequency fault 1.	0.1 s	R
	0…33554.4 s		Trip time 1		
44.05	UNDER FREQ 2 TIME	100 = 1 s	Defines a trip time for under frequency fault 2.	0.1 s	R
	0…33554.4 s		Trip time 2		
44.06	OVER FREQ 1 LIM	100 = 1 Hz	Defines a trip limit for over frequency fault 1. If the grid frequency (signal *02.18 GRID FREQUENCY*) exceeds this setting longer than the time delay in parameter *44.08 OVER FREQ 1 TIME*, the inverter will generate an alarm or a fault according to parameter *44.01 NAMU GRIDMON MODE*.	51.5 Hz	R
	45…65 Hz		Trip limit 1		
44.07	OVER FREQ 2 LIM	100 = 1 Hz	Defines a trip limit for over frequency fault 2. If the grid frequency (signal *02.18 GRID FREQUENCY*) exceeds this setting longer than the time delay in parameter *44.09 OVER FREQ 2 TIME*, the inverter will generate an alarm or a fault according to parameter *44.01 NAMU GRIDMON MODE*.	51.5 Hz	R
	45…65 Hz		Trip limit 2		
44.08	OVER FREQ 1 TIME	100 = 1 s	Defines a trip time for over frequency fault 1.	0.1 s	R
	0…33554.4 s		Trip time 1		
44.09	OVER FREQ 2 TIME	100 = 1 s	Defines a trip time for over frequency fault 2.	0.1 s	R
	0…33554.4 s		Trip time 2		

No.	Name/Value	FbEq	Description	Def.	T
44.10	UNDER VOLT 1 LIM	1 = 1%	Defines a trip limit for under voltage fault 1. If the grid voltage (signal *01.11 MAINS VOLTAGE*) is below this setting longer than the time delay in parameter *44.12 UNDER VOLT 1 TIME*, the inverter will generate an alarm or a fault according to parameter *44.01 NAMU GRIDMON MODE*.	80%	R
	0…200%		Trip limit 1		
44.11	UNDER VOLT 2 LIM	1 = 1%	Defines a trip limit for under voltage fault 2. If the grid voltage (signal *01.11 MAINS VOLTAGE*) is below this setting longer than the time delay in parameter *44.13 UNDER VOLT 2 TIME*, the inverter will generate an alarm or a fault according to parameter *44.01 NAMU GRIDMON MODE*.	80%	R
	0…200%		Trip limit 2		
44.12	UNDER VOLT 1 TIME	100 = 1 s	Defines a trip time for under voltage fault 1.	1.5 s	R
	0…33554.4 s		Trip time 1		
44.13	UNDER VOLT 2 TIME	100 = 1 s	Defines a trip time for under voltage fault 2.	1.5 s	R
	0…33554.4 s		Trip time 2		
44.14	OVER VOLT 1 LIM	1 = 1%	Defines a trip limit for over voltage fault 1. If the grid voltage (signal *01.11 MAINS VOLTAGE*) exceeds this setting longer than the time delay in parameter *44.16 OVER VOLT 1 TIME*, the inverter will generate an alarm or a fault according to parameter *44.01 NAMU GRIDMON MODE*.	120%	R
	0…200%		Trip limit 1		
44.15	OVER VOLT 2 LIM	1 = 1%	Defines a trip limit for over voltage fault 2. If the grid voltage (signal *01.11 MAINS VOLTAGE*) exceeds this setting longer than the time delay in parameter *44.17 OVER VOLT 2 TIME*, the inverter will generate an alarm or a fault according to parameter *44.01 NAMU GRIDMON MODE*.	120%	R
	0…200%		Trip limit 2		
44.16	OVER VOLT 1 TIME	100 = 1 s	Defines a trip time for over voltage fault 1.	0.1 s	R
	0…33554.4 s		Trip time 1		
44.17	OVER VOLT 2 TIME	100 = 1 s	Defines a trip time for over voltage fault 2.	0.1 s	R
	0…33554.4 s		Trip time 2		

No.	Name/Value	FbEq	Description	Def.	T
44.18	CUT-IN CHECK ENA		Enables or disables the checking of cut-in conditions (start conditions). Cut-in condition checking is based on measurements from the NAMU board. The limits for cut-in conditions are defined by parameters *44.19 CUT-IN FREQ LOW* … *44.22 CUT-IN VOLT HIGH*. See the figure below for more information. **Note:** Check that the NAMU board is enabled (parameter *40.02 NAMU BOARD ENABLE*) before enabling the cut-in conditions.	ON	B
	OFF	0	Checking of cut-in conditions is disabled.		
	ON	1	Checking of cut-in conditions is enabled.		
					
44.19	CUT-IN FREQ LOW	100 = 1 Hz	Defines the low limit for the frequency cut-in condition.	47.5 Hz	R
	45…65 Hz		Low limit for the grid frequency		
44.20	CUT-IN FREQ HIGH	100 = 1 Hz	Defines the high limit for the frequency cut-in condition.	50.05 Hz	R
	45…65 Hz		High limit for the grid frequency		
44.21	CUT-IN VOLT LOW	1 = 1%	Defines the low limit for the voltage cut-in condition.	90%	R
	90…110%		Low limit for the grid voltage		
44.22	CUT-IN VOLT HIGH	1 = 1%	Defines the high limit for the voltage cut-in condition.	110%	R
	90…110%		High limit for the grid voltage		
45 ANTI-ISLANDING			Parameters related to island detection. **Note:** Group 45 is write-protected. It can be write-enabled by giving a password with parameter *16.03 PASS CODE*.		
45.01	ISLAND DETECTION		Enables or disables island detection.	OFF	B
	OFF	0	Island detection is disabled.		
	ON	1	Island detection is enabled.		
45.02	ANTI-ISLAND MODE		Defines the method of the anti-island function.	PASSIVE	I
	PASSIVE	1	Passive anti-island.		
	RPV	2	Active anti-island (reactive power variation).		
45.03	RPV CYCLE TIME	1000 = 1 s	Defines the cycle time of the additional reactive power reference in the reactive power variation (RPV) method.	1 s	R
	0…8388.61 s				

No.	Name/Value	FbEq	Description	Def.	T
45.04	RPV AMPLITUDE	100 = 1%	Amplitude of the reactive power reference in the RPV method. Amplitude is defined in percentage of the parameter *04.06 CONV NOM POWER* when the inverter is running with full active power. Actual used amplitude of the used reactive power reference is scaled according to the present active power level.	1%	R
	0…100%		Amplitude of the reactive power reference in percent of *04.06 CONV NOM POWER*.		
45.05	ROCOF PEAK TRIP		Defines a trip level for the grid frequency change rate (ROCOF, rate of change of frequency).	4 Hz/s	R
	0…390.625 Hz/s	100 = 1 Hz/s	Trip level for the grid frequency change rate.		
93.07	D SET 27 VAL 1		Selects the address from which data word 1 of data set 27 is read. Update time is 500 ms.	211	I
93.08	D SET 27 VAL 2		Selects the address from which data word 2 of data set 27 is read. Update time is 500 ms.	212	I
93.09	D SET 27 VAL 3		Selects the address from which data word 3 of data set 27 is read. Update time is 500 ms.	213	I
93.10	D SET 29 VAL 1		Selects the address from which data word 1 of data set 29 is read. Update time is 500 ms.	127	I
93.11	D SET 29 VAL 2		Selects the address from which data word 2 of data set 29 is read. Update time is 500 ms.	803	I
93.12	D SET 29 VAL 3		Selects the address from which data word 3 of data set 29 is read. Update time is 500 ms.	111	I
93.13	D SET 31 VAL 1		Selects the address from which data word 1 of data set 31 is read. Update time is 500 ms.	0	I
93.14	D SET 31 VAL 2		Selects the address from which data word 2 of data set 31 is read. Update time is 500 ms.	0	I
93.15	D SET 31 VAL 3		Selects the address from which data word 3 of data set 31 is read. Update time is 500 ms.	0	I
93.16	D SET 35 VAL 1		Selects the address from which data word 1 of data set 33 is read. Update time is 500 ms.	0	I
93.17	D SET 35 VAL 2		Selects the address from which data word 2 of data set 33 is read. Update time is 500 ms.	0	I
93.18	D SET 35 VAL 3		Selects the address from which data word 3 of data set 33 is read. Update time is 500 ms.	0	I
99 START-UP DATA			Language, identification run selection etc.		
99.01	LANGUAGE		Selects the display language.	ENGLISH	I
	ENGLISH	0	English		
	DEUTSCH	2	German		
99.02	DEVICE NAME		Defines the name for the inverter unit. The name is visible on the control panel display in the Control Unit Selection mode or on the DriveWindow main menu. **Note:** The name can be typed only by using a PC tool.		C
			Name		
99.06	FAST SYNC		Activates the fast synchronization of the inverter unit at start.	YES	B
	NO	0	Inactive: synchronisation with phase order check		
	YES	1	Active: synchronisation without phase order check		

No.	Name/Value	FbEq	Description	Def.	T
99.07	LINE SIDE ID RUN		Enables/disables manual grid identification. See section *Grid identification* on page *33*.	YES	B
	NO	0	Disabled		
	YES	1	Enabled. The identification starts when the inverter unit receives a start command. (Identification takes about 4 seconds. It is not allowed to load the inverter unit during the identification.)		
99.08	AUTO LINE ID RUN		Enables/disables automatic grid identification. See section *Grid identification* on page *33*. **Note:** Automatic identification can be disabled after a successful ID run unless the phase order has changed afterwards.	YES	B
	NO	0	Disabled		
	YES	1	Enabled. The identification is requested automatically after control unit power-up. The identification starts automatically when the inverter receives the start command. The parameter actually forces parameter *99.07 LINE SIDE ID RUN* to *YES*. (Identification takes about 4 seconds. It is not allowed to load the inverter during the identification, and NAMU auxiliary measuring unit must not be in use.)		
99.09	APPLIC RESTORE		Restores the original parameter settings.	NO	B
	NO	0	No		
	YES	1	Yes		
99.10	SUPPLY ID NUMBER		This parameter can be used by an external control system to check the right connections of the optical cables to the inverter unit. This parameter requires support from the external control system to verify the correct connection.	0	I
	0…32767				

7

Fault tracing

What this chapter contains

This chapter lists all alarm and fault messages including the possible causes and corrective actions.

Safety

WARNING! Only qualified electricians are allowed to service the PVS800. Read the safety instructions in the appropriate hardware manual before working on the PVS800.

Alarm and fault indications

An alarm or a fault message indicates abnormal PVS800 status. Most alarm and fault causes can be identified and corrected using this information. If not, an ABB representative should be contacted.

The four digit code number in brackets after the message is for fieldbus communication. See chapter *Fieldbus control.*

How to reset

The PVS800 (master and inverter control units) can be reset either from DriveWindow, by pressing the keypad ***RESET*** key, by fieldbus, or switching the power off for a while. When the fault has been removed, the inverter can be restarted.

Fault history

When a fault is detected, it is stored in the fault history. The latest faults and alarms are stored together with the time stamp at which the event was detected.

The fault logger collects 64 of the latest faults. When the control unit power is switched off, 16 of the latest faults are stored.

The Fault History can be viewed using DriveWindow or by pressing the control panel double arrow keys (⏫ or ⏬) in the Actual Signal Display mode. The fault history can then be scrolled with arrow keys (🔼 and 🔽). To exit the fault history press an arrow key (⏫ or ⏬). The fault history can be cleared by pressing the ***RESET*** key.

Alarm and fault messages generated by the master control program

The parameter numbers and names in the table refer to the master control program unless otherwise indicated.

Note: When viewing the fault history of the master control program, fault and alarm messages originating in the inverter control program are preceded by a “>” sign.

Message	Alarm	Fault	Cause	What to do
>AI MIN FUNC (818B)	●		See *AI<MIN FUNC (8110)* (page *157*)	
>ANTI-ISLAND (819F)		●	Island operation has been detected in the grid.	Check the grid condition.
ALM (xx) *08.01 MAIN STATUS WORD* bit 7	●		Internal alarm.	Write down the code in brackets. Contact an ABB service representative.
ANALOG IO (5441) *09.10 IO FAULT WORD* bit 13	●	●	Analog I/O fault on the control unit.	Check control wiring. Replace control unit.
APPLIC 1 FLT (FFD6) *09.15 PVA ALARM WORD* bit 13	●		Adaptive program task alarm	Download adaptive program 1 using DriveAP 2.x or set block parameters by control panel or DriveWindow
APPLIC 2 FLT (FFD7) *09.15 PVA ALARM WORD* bit 14	●		Adaptive program task alarm	Download adaptive program 2 using DriveAP 2.x or set block parameters by control panel or DriveWindow
APP OVERLOAD (FFD9) *09.15 PVA ALARM WORD* bit 12	●		Application software overload. There is not enough processor capacity to execute blocks.	Reduce application software load, for example, • move some blocks to slower time level • disable point to point communication • disable some extension modules.
AUTORESET A (6081) *09.15 PVA ALARM WORD* bit 3	●		A sequence of automatic fault resets is in progress.	See parameter *30.05 NUMBER OF TRIALS* (page *66*). Check the fault log.
AUTORESET F (6080) *09.14 PVA FAULT WORD* bit 8		●	The end of a sequence of automatic fault resets has been reached.	See parameter *30.05 NUMBER OF TRIALS* (page *66*). Check the fault log.
>BACKPOW LEV (818E)		●	See *REVERSE POW (8187)* (page *166*)	
BACKUP ERROR (FFA2)		●	Failure in restoring PC-stored backup of parameters.	Retry. Check connections. Check that the parameters are compatible with the control program.
BACKUP USED (FFA3)	●		PC-stored backup of parameters is being downloaded into the control unit.	Wait until download is completed.

Message	Alarm	Fault	Cause	What to do
B1 CUR DEV (6181) B2 CUR DEV (6182) B3 CUR DEV (6183) … B20 CUR DEV (6194)	●		Current deviation detected in string box channel x (1…20).	Check for shading of the affected string. Ensure the panels in the affected string are clean and undamaged. Check the cabling of the affected string.
>CHARGING F (3284)		●	See *CHARGING FLT (3230)* (page *159*)	
CH2 COM LOSS (7520) *09.14 PVA FAULT WORD* bit 1		●	Communication error in CH2 between master and inverter control units.	Check that CH0 address in the inverter control program is correct. Check fibre optic cables between master and inverter control units. Check that the inverter control unit is powered. Replace fibre optic cables.
COMM MODULE (7510) *09.14 PVA FAULT WORD* bit 0 Parameter *70.05*	●	●	Cyclical communication between master control unit and type Rxxx fieldbus module, or between master control unit and external control system connected to DDCS channel CH0, is lost.	Check fieldbus communication status. See chapter *Fieldbus control*, or appropriate fieldbus adapter manual. Check group *51 MASTER ADAPTER* (fieldbus adapter) parameter settings. Check that channel CH0 node address is correct (parameter *70.01 CH0 NODE ADDR*). Check that the bus master is communicating and correctly configured. Check cable connections and groundings. Replace fibre optic cables.
>COMM MODULE (7581)		●	See *COMM MODULE (7510)* (page *159*)	
>COMM MODULE (758A)	●			
CTRL B TEMP (4110)		●	Control unit temperature exceeds 88 °C.	Check air flow and fan operation.
>DC BRK LEV (818C)		●	See *DC SWITCH LEV (818C)* (page *160*)	
>DC BRK POS (818D)		●	See *DC SWITCH POS (818D)* (page *160*)	
>DC BRK TRP (8188)		●	See *DC SWITCH TRP (8188)* (page *160*)	
DC OVERVOLT (32AF)		●	DC overvoltage measured by the inverter module.	Check the level of the DC voltage.
>DC UNDERVLT (3282)		●	See *DC UNDERVOLT (3220)* (page *160*).	
DIGITAL IO (5442) *09.10 IO FAULT WORD* bit 5		●	Digital I/O fault on the RMIO board	Check control wiring. Replace RMIO board or RDCU control unit.
>EARTH FAULT (2383)		●	See *EARTH FAULT (2387)* (page *160*).	
EM STOP (F081)	●		Emergency stop circuit is open.	Check the emergency stop circuit. Check the connection to digital input 6 (DI6).

Message	Alarm	Fault	Cause	What to do
EXT AIO (7081) *09.10 IO FAULT WORD* bit 14	●		Analog I/O error on RAIO I/O Extension module.	Check cabinet temperature. Replace RAIO module if alarm persists.
EXT DIO (7082) *09.10 IO FAULT WORD* bit 6	●		Digital input error on RDIO I/O Extension module.	Check cabinet temperature. Replace RDIO module if alarm persists.
>EXT DI1 (1082)		●	See *DI1 (9088)* (page *160*).	
>EXT DI1 ALM (1089)	●		See *DI1 (9081)* (page *160*).	
>EXT DI4 (1080)		●	See *EXT EVENT DI4 (9084)* (page *161*).	
>EXT DI4 ALM (108A)	●		See *EXT EVNT DI4 (908B)* (page *161*).	
>EXT DI5 (1081)		●	See *EXT EVENT DI5 (9085)* (page *161*).	
>EXT DI5 ALM (108B)	●		See *EXT EVNT DI5 (908C)* (page *161*).	
>EXT DI7 (FF96)		●	See *EXT EVENT DI7 (9087)* (page *161*).	
>EXT DI7 ALM (108C)	●		See *EXT EVNT DI7 (908E)* (page *161*).	
EXT EVNT DI3 (9083) *09.15 PVA ALARM WORD* bit 7	●		State of digital input DI3 changed to 0. By default, this message indicates overvoltage.	Check state of digital input DI3. Check setting of parameter *30.01 DI3 EXT EVENT*.
EXT EVNT DI3 (9083) *09.14 PVA FAULT WORD* bit 9		●		
EXT EVNT DI4 (9084) *09.15 PVA ALARM WORD* bit 8	●		State of digital input DI4 changed to 0. By default, this message indicates DC cable overcurrent.	Check state of digital input DI4. Check setting of parameter *30.02 DI4 EXT EVENT*.
EXT EVNT DI4 (9084) *09.14 PVA FAULT WORD* bit 10		●		
EXT EVNT DI5 (9085) *09.15 PVA ALARM WORD* bit 9	●		State of digital input DI5 changed to 0. By default, this input monitors the DC switch.	Check state of digital input DI5. Check setting of parameter *30.03 DI5 EXT EVENT*.
EXT EVNT DI5 (9085) *09.14 PVA FAULT WORD* bit 11		●		
FACTORY FILE (FFA7)		●	Factory macro parameter error.	Replace RMIO board or RDCU control unit.
FLT (xx) *08.01 MAIN STATUS WORD* bit 3		●	Internal fault.	Write down the fault code in brackets. Contact ABB service.
GND CLOSE ER (819B)		●	Grounding disconnector was not properly closed. This may be caused by: • Wrong DC to the ground voltage status • Too high continuous leakage current	Check that the selected grounding resistance is suitable with the solar modules in use.
GND HIGH CUR (819D)		●	High continuous GND leakage current has been detected.	Check that the selected grounding resistance is suitable with the solar modules in use.
GND HIGH VOLT (819E)		●	DC to the ground voltage is high when the grounding disconnector is closed.	Check that the selected grounding resistance is suitable with the solar modules in use.
GND LEAK CUR (819C)		●	Sudden change has been detected in the GND leakage current.	Check if there is something abnormal connected to the DC busbars.
>GRID MONALM (8191)	●		See *GRID MON ALM (8191)* (page *162*).	
>GRID MONFLT (8189)		●	See *GRID MON FLT (8189)* (page *162*).	

Message	Alarm	Fault	Cause	What to do
ID N CHANGED (FF68)	●		This alarm message is generated by the control panel. Panel ID number of the master control unit has been changed from 1 via the control panel (the change is not shown on the display).	To change the panel ID number back to 1, go to the Control Unit Selection mode by pressing ***DRIVE***. Press ***ENTER***. Set the ID number to 1. Press ***ENTER***.
ILLEGAL INST (FF5F)		●	Operating system error.	Replace RMIO board or RDCU control unit.
INSUL RESIST (8195)	●		Insulation resistance is too low. DC grounding cannot be switched on.	Check insulation measurement.
>INTERNAL F (1083)		●	See *INTERNAL FAULT* (page *163*).	
I/O FAULT (7000) *09.10 IO FAULT WORD*		●	I/O communication fault or error detected on channel CH1 of the RDCO module or on some I/O device. This can be caused by a fault in the RDCO module, in the RMIO control board or in an I/O extension module, or by a faulty/loose fibre optic cable connection.	Check the connections between the RMIO board and RDCO module. Test with new fibre optic cables. Replace the RDCO module / RMIO board. Check the alarm messages: if any I/O extension alarms are indicated. Replace the I/O extension module.
IO START ENA (61AA)	●		I/O control has been enabled and a start command is active. The PVS800 is starting automatically.	Informative alarm.
ISU FAULT (8185) *08.01 MAIN STATUS WORD* bit 3		●	Inverter unit has tripped on a fault.	Check the reason for fault in parameter *09.11 SUPPLY FAULT WORD* or *09.14 PVA FAULT WORD*, or inverter unit fault log.
ISU WARNING (8186) *08.01 MAIN STATUS WORD* bit 7	●		Inverter unit has an alarm.	Check the reason for alarm from *09.12 SUPPLY ALARM WORD* or *09.15 PVA ALARM WORD*, or inverter unit fault log.
LOAD FACTORY (FF69)	●		Factory parameter settings are being restored.	Wait until restoring is completed.
>LOST ENERGY (8190)	●		See *LOST ENERGY (8192)* (page *163*)	
>MAIN CNT F (2384)		●	See *MAIN CNT FLT (FF17)* (page *163*)	
>MPPT MAX REF (32AE)	●		DC voltage reference is at the high limit. This may be caused by incorrect sizing of the solar array or by power limitation.	Check the external DC voltage reference in parameter *32.01 EXT MPPT DC REF*. Check the sizing of the solar array. Check the power limitation in parameter *31.16 POWER LIMITING*.
>MPPT MIN REF (32AD)	●		DC voltage reference is at the low limit.	Check the external DC voltage reference in parameter *23.01 EXT MPPT DC REF*.
>NET LOST (32A6)	●		See *NET LOST (32A3)* (page *163*)	
>NET VOLT (3285)		●	See *NET VOLT FLT (3100)/(32A2)* (page *163*)	

Message	Alarm	Fault	Cause	What to do
NO COMMUNICATION	●		This alarm message is generated by the control panel. Cabling problem or hardware malfunction detected on panel link. If (×) = 4, control panel type is not compatible with the master control program version.	Check control panel link connections. Press RESET key. Reset may take up to half a minute. Please wait. Check control panel type and version of the master control program (see parameter group *04 INFORMATION*). The panel type is printed on the panel housing.
NVOS		●	Non-volatile operating system error	Replace RMIO board or RDCU control unit.
>OVERCURR (2380)		●	See *OVERCURRENT (2310)* (page *164*)	
PANEL LOST (5300) *09.12 SUPPLY ALARM WORD* bit 1	●		Local control device (control panel or DriveWindow PC tool) selected as active control location has ceased communicating. **Note:** The PVS800 shifts to the remote control mode automatically.	Check control panel and PC connections. Check control panel connector. See hardware manual. Replace control panel.
>PANEL LOST (5382)	●		See *PANEL LOST (5300)* (page *164*)	
PARAM CRC (6320)		●	CRC (Cyclic Redundancy Check) error.	Switch control unit power off and on again. Reload firmware onto control unit. Replace control unit.
>PLIM EXT TMP (44AB)	●		Active power is limited due to high ambient temperature.	Check the cooling of the inverter.
POWFAIL FILE (FFA0)			Error in restoring powerfail.ddf file	If the alarm persists, replace RMIO board or RDCU control unit.
>POW IPPTMP (818F)	●		See *PLIM EXT TMP (44A0)* (page *164*)	
PVA RUN ENA (FF54) *09.15 PVA ALARM WORD* bit 2	●		A start command has been given while stand by has been forced by parameter *31.01 ENABLE MPPT* or while bit 3 in *08.05 PVA STATUS WORD* is clear.	Check the setting of *31.01 ENABLE MPPT*.
>PVS&PANEL DC (32A9)	●		See *PVS&PANEL DC (32A8)* (page *165*)	
>PVS800 TEMP (4291)		●	See *PVS800 TEMP (4294)* (page *165*)	
>PVS800 TEMP (4292)	●			
>QLIM EXT TMP (44AC)	●		Reactive power is limited due to high ambient temperature.	Check the cooling of the inverter.
>RECHARGE ALM (32AA)	●		See *RECHARGE ALM (3250)* (page *166*)	
>REVERSE POW (8187)		●	See *REVERSE POW (8187)* (page *166*)	
RMBA LOST (61A9) *09.15 PVA ALARM WORD* bit 11	●		String monitoring is activated but no RMBA module is installed to RDCU slot 2.	Install and activate RMBA.
>RUN DISABLE (8194)	●		Start inhibition is active in the inverter control program.	Check emergency stop circuit.
>SHORT CIRC (2381)		●	See *SHORT CIRC (2340)* (page *166*)	

Message	Alarm	Fault	Cause	What to do
SBOX 1 LINK (6195) SBOX 2 LINK (6196) SBOX 3 LINK (6197) … SBOX 20 LINK (61A8)	●		Communication with string box channel x (1…20) lost.	Check the wiring of the affected channel. Check also the line termination and node addresses.
>SYNCHRO FLT (8180)		●	See *SYNCHRO FLT (8180)* (page *167*)	
SYSTEM START (1087)	●		Control program has been started (control unit is powered).	If this message appears during normal operation, check the 24 V supply to the control unit. Check the wiring for breakages and short circuits.
UDC HIGH LIM (32A7) *09.15 PVA ALARM WORD* bit 6	●		Measured DC voltage exceeds high limit.	See *DC overvoltage monitoring* (page *33*).

Alarm and fault messages generated by the inverter control program

The parameter numbers and names in the table refer to the inverter control program unless otherwise indicated.

Message	Alarm	Fault	Cause	What to do
AC OVERFREQ (3141) *09.01 FAULT WORD 1* bit 9		●	NAMU grid monitoring has faulted.	Check group *44 GRID MONITORING*. Check the grid condition.
AC OVERFREQ (31A2)	●		NAMU grid monitoring has alarmed.	Check group *44 GRID MONITORING*. Check the grid condition.
AC OVERVOLT (3110) *09.01 FAULT WORD 1* bit 11		●	NAMU grid monitoring has faulted.	Check group *44 GRID MONITORING*. Check the grid condition.
AC OVERVOLT (31A0)	●		NAMU grid monitoring has alarmed.	Check group *44 GRID MONITORING*. Check the grid condition.
AC UNDERFREQ (3142) *09.01 FAULT WORD 1* bit 8		●	NAMU grid monitoring has faulted.	Check group *44 GRID MONITORING*. Check the grid condition.
AC UNDERFREQ (31A3)	●		NAMU grid monitoring has alarmed.	Check group *44 GRID MONITORING*. Check the grid condition.
AC UNDERVOLT (3120) *09.01 FAULT WORD 1* bit 10		●	NAMU grid monitoring has faulted.	Check group *44 GRID MONITORING*. Check the grid condition.
AC UNDERVOLT (31A1)	●		NAMU grid monitoring has alarmed.	Check group *44 GRID MONITORING*. Check the grid condition.
AI<MIN FUNC (8110) Master control program *09.12 SUPPLY ALARM WORD* bit 3 *09.12 SUPPLY ALARM WORD* bit 3	●		Analog control signal 4…20 mA is below minimum allowed value of 3.1 mA. This can be caused by incorrect signal level or failure in control wiring.	Check for proper analog control signal level. Check minimum limit settings (parameters *13.06 MINIMUM AI2* and *13.10 MINIMUM AI3*). Check control wiring.
ALM (xx) *08.01 MAIN STATUS WORD* bit 7	●		Inverter internal alarm	Check the connections of the inverter unit. Write down alarm code (in brackets). Contact an ABB service representative.
ANTI-ISLAND (8193) *09.10 PV FLT ALM WORD* bit 11		●	Grid in island state	Check group *44 GRID MONITORING*. **Note:** LVRT cannot be used at the same time (group *40 LVRT CONTROL*).
AP PRG ERR (FFD6)	●		Error in the adaptive program	Check the adaptive program for errors. Check parameters *57.01*…*58.05*.

Message	Alarm	Fault	Cause	What to do
BATT FAILURE (5581)	●		(Only with parallel-connected inverter modules.) APBU branching unit memory backup battery error caused by • incorrect APBU switch S3 setting • too low battery voltage.	Enable backup battery by setting actuator 6 of switch S3 to ON. Replace backup battery. **Note:** Actuator 6 of switch S3 is normally activated (ON) during commissioning. **Note:** Set actuator 6 of switch S3 to OFF when APBU is stored as spare part.
CAB TEMP DIF (4188) *09.04 ALARM WORD 1* bit 9	●		Measured cabinet temperature difference has reached alarm level 15 ºC.	Check the value of *01.36 CABINET TEMP 1* and *01.37 CABINET TEMP 2*. Check the ambient conditions. Check the air flow and fan operation. Check the line current against the inverter nominal current. Check group *24 REACTIVE POWER*.
CAB TEMP1 HI (4180) *09.03 FAULT WORD 3* bit 8		●	Measured cabinet temperature has reached alarm level 65 ºC.	See *CAB TEMP1 HI (4181)*.
CAB TEMP1 HI (4181) *09.04 ALARM WORD 1* bit 0	●		Measured cabinet temperature has reached alarm level 60 ºC.	Check the value of *01.36 CABINET TEMP 1* and *01.37 CABINET TEMP 2*. Check the ambient conditions. Check the air flow and fan operation. Check the line current against the inverter nominal current. Check group *24 REACTIVE POWER*.
CAB TEMP1 LO (4182) *09.03 FAULT WORD 3* bit 9		●	Measured cabinet temperature has reached alarm level -22 ºC.	Check the physical connection of PT100. Check the value of *01.36 CABINET TEMP 1* and *01.37 CABINET TEMP 2*. Check the ambient conditions.
CAB TEMP1 LO (4183) *09.04 ALARM WORD 1* bit 1	●		Measured cabinet temperature has reached alarm level -17 ºC.	Check the value of *01.36 CABINET TEMP 1* and *01.37 CABINET TEMP 2*. Check the ambient conditions.
CAB TEMP2 HI (4184) *09.03 FAULT WORD 3* bit 10		●	Measured cabinet temperature has reached alarm level 65 ºC.	See *CAB TEMP1 HI (4181)*.
CAB TEMP2 HI (4185) *09.04 ALARM WORD 1* bit 7	●		Measured cabinet temperature has reached alarm level 60 ºC.	See *CAB TEMP1 HI (4181)*.
CAB TEMP2 LO (4186) *09.03 FAULT WORD 3* bit 11		●	Measured cabinet temperature has reached alarm level -22 ºC.	Check the physical connection of PT100. Check the value of *01.36 CABINET TEMP 1* and *01.37 CABINET TEMP 2*. Check the ambient conditions.
CAB TEMP2 LO (4187) *09.04 ALARM WORD 1* bit 8	●		Measured cabinet temperature has reached alarm level -17 ºC.	See *CAB TEMP1 LO (4183)*.

Message	Alarm	Fault	Cause	What to do
CHARGING FLT (3230) Master control program *09.11 SUPPLY FAULT WORD* bit 0 *09.10 PV FLT ALM WORD* bit 0 *09.11 SUPPLY FAULT WORD* bit 0		●	DC link voltage is not high enough after charging. DC link voltage has not exceeded minimum limit or current is not below preset limit. Faulty PPCC link (DC voltage measurement is zero)	Check charging circuit fuses. Check charging circuit. Check possible DC short circuit. Check undervoltage trip limit (parameter *30.12 DC UNDERVOLT TRIP*). Check PPCC link. See *PPCC LINK (5210)* on page *165*.
CH2 COM LOST (7520)		●	Control unit CH2 (AC voltage measurement) communication error.	Check fiber optic cables on DDCS channel CH2 of the inverter control unit. Replace RDCO module.
COMM MODULE (7510) Master control program *09.11 SUPPLY FAULT WORD* bit 10 Master control program *09.12 SUPPLY ALARM WORD* bit 0 *09.02 FAULT WORD 2* bit 12 *09.11 SUPPLY FAULT WORD* bit 10 *09.12 SUPPLY ALARM WORD* bit 0	●	●	Cyclical communication between master control unit channel CH2 and inverter control unit channel CH0 has been lost.	Check that the master control unit is communicating and correctly configured. Check fiber optic cables between master control unit CH2 and inverter control unit CH0. Replace fiber optic cables.
CTRL B TEMP (4110) *09.02 FAULT WORD 2* bit 7		●	RMIO control board temperature exceeds 75 °C.	Check air flow and fan operation.
CUR UNBAL (2330) *09.13 CURRENT UNBALANCE*		●	Excessive output current unbalance in the inverter unit (or one of parallel-connected inverter modules) The name of the message indicates the number of the inverter module.	Check power cables. Check inverter fuses. Check inverter(s). Check LCL filter.
CUR UNBAL 1 (23E0) CUR UNBAL 2 (23E1) CUR UNBAL 3 (23E2) … CUR UNBAL 12 (23EB) *09.13 CURRENT UNBALANCE*		●		
DC OVERVOLT (3210) *09.01 FAULT WORD 1* bit 2 *09.11 SUPPLY FAULT WORD* bit 15		●	Excessive DC voltage. This can be caused by • grid static or transient overvoltages, or • excessive network voltage during synchronisation. The default trip limit is 1000 V.	Check level of network voltage, DC voltage and inverter nominal voltage. Check DC overvoltage trip limit (inverter control program parameter *30.11 DC OVERVOLT TRIP*).
DC UNDERVOLT (3220) Master control program *09.11 SUPPLY FAULT WORD* bit 14 *09.02 FAULT WORD 2* bit 2 *09.11 SUPPLY FAULT WORD* bit 14		●	DC voltage is not sufficient due to missing network phase, blown fuse or internal inverter fault.	Check main and inverter fuses. Check network voltage. Check DC undervoltage trip limit (inverter control program parameter *30.12 DC UNDERVOLT TRIP*).
DCREF MAX RNG (32AC) *08.06 MPPT STATUS* bit 9	●		MPPT has reached the DC reference maximum range.	Check the settings of parameters *30.05 MPPT DC REF MIN* and *30.15 DCREF RANGE ALARM*.
DCREF MIN RNG (32AB) *08.06MPPT STATUS* bit 8	●		MPPT has reached the DC reference minimum range.	Check the settings of parameters *30.05 MPPT DC REF MIN* and *30.15 DCREF RANGE ALARM*.

Message	Alarm	Fault	Cause	What to do
DC SWITCH LEV (818C) Master control program *09.14 PVA FAULT WORD* bit 5 *09.10 PV FLT ALM WORD* bit 3		●	Voltage difference detected over a closed DC switch.	Check DC fuses. Check the DC voltages on both sides of the DC switch.
DC SWITCH POS (818D) Master control program *09.14 PVA FAULT WORD* bit 6 *09.10 PV FLT ALM WORD* bit 4		●	DC switch status signal does not follow an open/close command	Check DC switch acknowledgement status. Check that the DC switch follows command signals.
DC SWITCH TRP (8188) Master control program *09.14 PVA FAULT WORD* bit 3 *09.10 PV FLT ALM WORD* bit 1		●	DC switch tripped	Check auxiliary power for DC switch. Check that DC switch DIP switch is in “AUTO” position. Check DC switch trip status. If trip signal is not active, try reclosing the switch.
DI1 (9081) Master control program *09.12 SUPPLY ALARM WORD* bit 2 *09.12 SUPPLY ALARM WORD* bit 2	●		Fan is not rotating or fan contactor connection is loose. This supervision is valid only when inverter is in RDY_RUN state (ie, parameter *08.01 MAIN STATUS WORD* bit 1 = 1).	Check acknowledge circuit connected to digital input DI1 of the inverter control unit. Check fan. Replace if necessary.
DI1 (9088) Master control program *09.11 SUPPLY FAULT WORD* bit 5 *09.11 SUPPLY FAULT WORD* bit 5		●		
DI4 RESTR ALM (907B)	●		Fault indicated by insulation monitoring device. Automatic autoreset in progress.	Informative alarm. The PVS800 will automatically reset the indication five times.
DI4 RESTR FLT (9074)		●	Permanent fault indicated by insulation monitoring device	Check the installation for insulation or earth faults. Check the settings and wiring of the insulation monitoring device.
EARTH FAULT (2387) *09.12 SUPPLY ALARM WORD* bit 13 Parameter *30.02*	●		Ground/Earth fault in grounded/earthed network. Sum of line currents measured with internal current transducers is too high. Earth (ground) fault level too sensitive.	Check main fuses (in case of parallel-connected inverter modules). Check for earth leakages. Check power cabling. Check inverter module(s). Check setting of parameter *30.03 EARTH FAULT LEVEL*.
EARTH FAULT (2330) Master control program *09.11 SUPPLY FAULT WORD* bit 12 *09.01 FAULT WORD 1* bit 4 *09.11 SUPPLY FAULT WORD* bit 12 Parameter *30.02*		●	Ground/Earth fault in grounded/earthed network. Sum of line currents measured with internal current transducers is too high. Ground/Earth fault in LCL filter, DC circuit, inverter(s), or current imbalance in parallel-connected inverter modules. Earth (ground) fault level too sensitive.	Check main fuses (in case of parallel- connected inverter modules). Check for earth leakages. Check power cabling. Check inverter module(s). Check setting of parameter *30.03 EARTH FAULT LEVEL*.

Message	Alarm	Fault	Cause	What to do
EXT ANALOG IO (7081) *09.04 ALARM WORD 1* bit 10	●		Analog I/O error on RAIO I/O Extension module.	Check cabinet temperature. Replace RAIO module if alarm is continuously active.
EXT DIO (7082)	●		Error in the RDIO module or module configuration	Check that configuration for the RDIO modules is correct in the parameter group *98 OPTION MODULES*. Replace the RDIO module if the alarm is continuously active.
EXT EVENT DI4 (9084) Master control program *09.11 SUPPLY FAULT WORD* bit 4 *09.11 SUPPLY FAULT WORD* bit 4 Parameter *30.04*		●	Digital input DI4 fault	Check digital input DI4. Check setting of parameter *30.04 DI4 EXT EVENT*.
EXT EVENT DI5 (9085) Master control program *09.11 SUPPLY FAULT WORD* bit 2 *09.11 SUPPLY FAULT WORD* bit 2 Parameters *30.05* and *30.10*		●	Digital input DI5 fault	Check digital input DI5. Check settings of parameters *30.05 DI5 EXT EVENT* and *30.10 DI5 TRIP DELAY*.
EXT EVENT DI7 (9087) Master control program *09.11 SUPPLY FAULT WORD* bit 11 *09.11 SUPPLY FAULT WORD* bit 11 Parameters *30.13* and *30.14*		●	Digital input DI7 (DIIL) fault	Check digital input DI7 (DIIL). Check settings of parameters *30.13 DI7 EXT EVENT* and *30.14 DI7 TRIP DELAY*.
EXT EVNT DI4 (908B) Master control program *09.12 SUPPLY ALARM WORD* bit 13 *09.12 SUPPLY ALARM WORD* bit 13 Parameter *30.04*	●		Digital input DI4 alarm	Check digital input DI4. Check setting of parameter *30.04 DI4 EXT EVENT*.
EXT EVNT DI5 (908C) Master control program *09.12 SUPPLY ALARM WORD* bit 14 *09.12 SUPPLY ALARM WORD* bit 14 Parameter *30.05*	●		Digital input DI5 alarm	Check digital input DI5. Check setting of parameter *30.05 DI5 EXT EVENT*.
EXT EVNT DI7 (908E) Master control program *09.12 SUPPLY ALARM WORD* bit 11 *09.12 SUPPLY ALARM WORD* bit 11 Parameter *30.13*	●		Digital input DI7 (DIIL) alarm	Check digital input DI7 (DIIL). Check setting of parameter *30.13 DI7 EXT EVENT*.
EXT TMP1 HIGH (4491) *09.03 FAULT WORD 3* bit 2 *09.04 ALARM WORD 1* bit 2	●	●	External overtemperature 1	Check limits of external temperature measurement in group *30 FAULT FUNCTIONS*.
EXT TMP2 HIGH (4492) *09.03 FAULT WORD 3* bit 3 *09.04 ALARM WORD 1* bit 3	●	●	External overtemperature 2	
EXT TMP3 HIGH (4493) *09.03 FAULT WORD 3* bit 4 *09.04 ALARM WORD 1* bit 4	●	●	External overtemperature 3	
EXT TMP4 HIGH (4494) *09.03 FAULT WORD 3* bit 5 *09.04 ALARM WORD 1* bit 5	●	●	External overtemperature 4	

Message	Alarm	Fault	Cause	What to do
EXT TMP1 LOW (4495) *09.03 FAULT WORD 3* bit 2 *09.04 ALARM WORD 1* bit 2	●	●	External undertemperature 1	Check limits of external temperature measurement in group *30 FAULT FUNCTIONS*.
EXT TMP2 LOW (4496) *09.03 FAULT WORD 3* bit 3 *09.04 ALARM WORD 1* bit 3	●	●	External undertemperature 2	
EXT TMP3 LOW (4497) *09.03 FAULT WORD 3* bit 4 *09.04 ALARM WORD 1* bit 4	●	●	External undertemperature 3	
EXT TMP4 LOW (4498) *09.03 FAULT WORD 3* bit 5 *09.04 ALARM WORD 1* bit 5	●	●	External undertemperature 4	
FLT (xx) *08.01 MAIN STATUS WORD* bit 3		●	Internal fault	Check connections inside inverter cabinet. Write down the fault code (in brackets). Contact an ABB service representative.
GD DISABLE (FF53) *08.24 GD DISABLE WORD* bit 0		●	AGPS power supply of one or more parallel-connected modules has been switched off during run. The name of the message indicates the number of the inverter module.	Check the prevention of unexpected start-up circuit. Replace the AGPS board of the affected inverter module.
GD DISABLE 1 (54A2) GD DISABLE 2 (54A3) GD DISABLE 3 (54A4) … GD DISABLE 12 (54AD) *08.24 GD DISABLE WORD*		●		
GRID MON ALM (8191) *09.10 PV FLT ALM WORD* bit 8	●		Fault indicated by grid monitoring relay	Check grid condition. Check grid monitoring relay settings. Check setting of parameter *39.06 GRIDMON SUPV MODE*.
GRID MON FLT (8189) Master control program *09.14 PVA FAULT WORD* bit 4 *09.10 PV FLT ALM WORD* bit 0		●		
HIGH UAC LEV (32A5) *09.01 FAULT WORD 1* bit 5		●	High AC voltage measured long enough	Check parameters *40.21 TRP VOLT LEV* and *40.22 TRP VOLT TIME*.
HIGH UAC PEAK (32A4) *09.01 FAULT WORD 1* bit 5		●	High AC voltage peak	Check parameter *40.20 TRP VOLT PEAK*.
ID N CHANGED (FF68)	●		Inverter ID number has been changed from 2 (change is not displayed on control panel).	To change ID number back to 2 go to the Control Unit Selection mode by pressing ***DRIVE***. Press ***ENTER***. Set ID number to 2. Press ***ENTER***.
INT CONFIG (5410)		●	Number of parallel-connected inverter modules is set incorrectly.	Check setting of parameter *16.11 INT CONFIG USER*.
INTERNAL FAULT Master control program *09.11 SUPPLY FAULT WORD* bit 8 *09.01 FAULT WORD 1* bit 7 *09.11 SUPPLY FAULT WORD* bit 8		●	Internal fault in the inverter unit.	Quote exact message from fault log and contact ABB service.
INV OVERTEMP (4290) *09.03 FAULT WORD 3* bit 12		●	Inverter unit temperature is excessive.	Check internal cooling system.
INV OVERTEMP (4293) *09.04 ALARM WORD 1* bit 12	●		Inverter unit temperature is excessive.	Check internal cooling system.

Message	Alarm	Fault	Cause	What to do
IO FAULT (7000) *09.02 FAULT WORD 2* bit 6		●	I/O communication fault or error detected on channel CH1 of RDCO module. This can be caused by fault in RDCO module or RMIO control board or faulty/loose fibre optic cable connection.	Check connections between control unit and RDCO module. Test with new fibre optic cables. Replace RDCO module / RMIO board.
LOAD FACTORY (FF69)	●		Factory parameter settings are being restored.	Wait until restore is completed.
LOST ENERGY (8192) Master control program *09.15 PVA ALARM WORD* bit 5 *09.10 PV FLT ALM WORD* bit 7	●		Energy limiting is active (master control program parameter *31.16 POWER LIMITING* is set to a value below 100%)	Informative alarm.
LVRT RIDETRGH (32A0)	●		AC voltage is lower than *40.10 RT U/Un LEVEL1*	Alarm is cleared when the AC voltage is greater than *40.10 RT U/Un LEVEL1* + 5%. Check the parameter settings in group *40 LVRT CONTROL*.
MAIN CNT FLT (FF17) Master control program *09.11 SUPPLY FAULT WORD* bit 6 *09.11 SUPPLY FAULT WORD* bit 6		●	Main contactor is not functioning properly, or connection is loose.	Check main contactor control circuit wiring. Check main contactor operating voltage level. Check inverter control unit DI3 connections.
MOD BOARD T (FF88) *09.03 FAULT WORD 3* bit 14		●	Overtemperature in AINT board of inverter module.	Check inverter module fan. Check ambient temperature.
MOD BOARD T (FF92) *09.04 ALARM WORD 1* bit 14	●			
NET LOST (32A3) Master control program *09.12 SUPPLY ALARM WORD* bit 10 *09.12 SUPPLY ALARM WORD* bit 10	●		Network voltage is lost during modulation. Line current is below supervision limit or line frequency differs more than 5 Hz from initial value of 50 or 60 Hz.	Check network conditions (power breaks, voltage transients). Check network connections. Check main fuses.
NET VOLT FLT (3100)/(32A2) Master control program *09.11 SUPPLY FAULT WORD* bit 9 *09.11 SUPPLY FAULT WORD* bit 9		●	Network voltage is out of acceptable range during grid identification.	Check network voltage. Restart unit.
NO COMMUNICATION (x)	●		This alarm message is generated by control panel. - Cabling problem or hardware malfunction detected on panel link. - If (x) = (4), panel type is not compatible with the inverter program version.	Check panel link connections. Press ***RESET*** key. Reset may take up to half a minute, please wait. Check panel type and version of the inverter application program (see parameter group *04 INFORMATION*). Panel type is printed on panel cover.

Message	Alarm	Fault	Cause	What to do
OVERCURRENT (2310) Master control program *09.11 SUPPLY FAULT WORD* bit 1 *09.01 FAULT WORD 1* bit 1 *09.11 SUPPLY FAULT WORD* bit 1 *09.14 OVERCURRENT FAULT*		●	Excessive input current in the inverter unit (or one of parallel-connected inverter modules). There are two overcurrent trip limits: • 0.98 × inverter maximum current (parameter *04.08 CONV MAX CURRENT*) • approximately 190% of inverter nominal current (parameter *04.05 CONV NOM CURRENT*). The name of the message indicates the number of the inverter module.	Check network voltage. Check inverter power semiconductors (IGBTs) and current transducers.
OVERCURR 1 (23A0) OVERCURR 2 (23A1) … OVERCURR 12 (23AB) *09.14 OVERCURRENT FAULT*		●		
OVER SWFREQ (FF55) *09.02 FAULT WORD 2* bit 9		●	Switching overfrequency fault. This may be due to hardware fault in circuit boards.	Replace RMIO board or RDCU control unit. Replace INT board. With parallel connected inverter modules, replace APBU (or NPBU) branching unit.
PANEL LOST (5300) Master control program *09.12 SUPPLY ALARM WORD* bit 1 *09.12 SUPPLY ALARM WORD* bit 1	●		Local control device (control panel or DriveWindow PC tool) selected as active control location has ceased communicating. **Note:** Inverter unit shifts to the remote control mode automatically.	Check control panel and PC connections. Check control panel connector. See hardware manual. Replace control panel.
PLIM EXT TMP (44A0) Master control program *09.15 PVA ALARM WORD* bit 4 *09.12 SUPPLY ALARM WORD* bit 6	●		Inverter temperature is limiting active power.	Check ambient conditions. Check air flow and fan operation. Check heatsink fins for dust pick-up. Check line current against inverter nominal current.
POWERFAIL (3381) *09.25 POWERFAIL FAULT* bit 0		●	AINT board power loss in the inverter unit (or one of parallel-connected inverter modules). The name of the message indicates the number of the inverter module.	Check that AINT board power cable is connected. Check that APOW board is working correctly. Replace AINT board.
POWERF INV 1 (3382) POWERF INV 2 (3383) POWERF INV 3 (3384) … POWERF INV12 (338D) *09.25 POWERFAIL FAULT*		●		
PPCC LINK (528C)	●		Occasional runtime communication errors (CRC and 4/5B coding errors) in the link between control unit and inverter module(s).	Check the fiber optic cables between the control unit and the inverter module(s) if the alarm is continuously active.

Message	Alarm	Fault	Cause	What to do
PPCC LINK (5210) *09.02 FAULT WORD 2* bit 11 *09.24 PPCC FAULT WORD* bit 0		●	AINT board current measurement fault, or communication fault between control unit and AINT board in the inverter unit (or one of parallel-connected inverter modules). The fault is activated when charging is completed and the DC voltage is high, but not when DC voltage is disconnected and the control unit has an external power supply. Faulty power stage.	If the control unit is powered from external supply, ensure that the supply is on. Check fiber optic cable connection between RDCU control unit and inverter modules. If the fault persists, replace APBU branching unit, RDCU control unit and inverter AINT board (in this order) until fault disappears. Check the output power semiconductors of the affected inverter module.
PPCC LINK 1 (5280) PPCC LINK 2 (5281) PPCC LINK 3 (5282) … PPCC LINK 12 (528B) *09.24 PPCC FAULT WORD*		●	The name of the message indicates the number of the inverter module.	
PVS&PANEL DC (32A8) Master control program *09.15 PVA ALARM WORD* bit 1 *09.10 PV FLT ALM WORD* bit 9	●		The inverter DC voltage cannot be controlled to a level close enough to solar panel DC voltage. The DC switch cannot be closed.	At start, check the solar panel and inverter DC voltages (*01.01 PV CELL DC* and *01.10 DC VOLTAGE* respectively). Compare inverter DC reference range to panel open loop DC voltage (max. 1000 V DC at start).
PVS800 TEMP (4294) Master control program *09.12 SUPPLY ALARM WORD* bit 4 *09.12 SUPPLY ALARM WORD* bit 4	●		Inverter IGBT temperature is excessive. Alarm is activated if temperature exceeds 115 °C.	Check ambient conditions. Check air flow and fan operation. Check heatsink fins for dust pick-up. Check line current against inverter current.
PVS800 TEMP (4210) Master control program *09.11 SUPPLY FAULT WORD* bit 3 *09.01 FAULT WORD 1* bit 3 *09.11 SUPPLY FAULT WORD* bit 0 *09.16 OVERTEMP WORD*		●	Inverter module IGBT temperature is excessive. Trip level is 120 °C.	
PVS TEMP 1 U (42A0) PVS TEMP 1 V (42A1) PVS TEMP 1 W (42A2) PVS TEMP 2 U (42A3) PVS TEMP 2 V (42A4) PVS TEMP 2 W (42A5) … PVS TEMP 12W (42C3) *09.16 OVERTEMP WORD*		●	The name of the message indicates the number of the inverter module and phase.	
QLIM PVS TMP (44A2) Master control program *09.15 PVA ALARM WORD* bit 4 *09.12 SUPPLY ALARM WORD* bit 6	●		Inverter temperature is limiting reactive power.	Check ambient conditions. Check air flow and fan operation. Check heatsink fins for dust pick-up. Check line current against inverter nominal current.
RECHARGE ALM (3250) Master control program *09.15 PVA ALARM WORD* bit 15	●		DC circuit charging attempted twice within one minute. The charging is delayed to allow the charging resistors to cool down.	Informative alarm.

Message	Alarm	Fault	Cause	What to do
REPLACE FAN (4280)	●		Running time of inverter module cooling fan has exceeded its estimated life time.	Change fan. Reset fan run time counter. See parameter *01.31 FAN ON-TIME*.
REVERSE POW (8187) Master control program *09.14 PVA FAULT WORD* bit 2 (peak) Master control program *09.14 PVA FAULT WORD* bit 7 (level) *09.10 PV FLT ALM WORD* bit 0 (peak) *09.10 PV FLT ALM WORD* bit 5 (level)		●	Power flow is from the network towards the solar panels.	Check power flow. If an external reference is used, set it to a value lower than the solar generator voltage. Restart unit.
RT NET LOST (32A1) *09.11 SUPPLY FAULT WORD* bit 9		●	Supply voltage out of RT-area. Missing phase(s) or frequency out of allowed range for 20 seconds during synchronization.	Check RT area parameters *40.10*…*40.15*. Check network conditions. Check that the initialized base frequency signal *03.03* or *03.04* is correct.
RUN DISABLED (FFAC) *08.06 MPPT STATUS* bit 7 (bit=1 start enable)		●	Cut-in conditions are not fulfilled	Check the settings of parameters *44.18*…*44.22*.
SHORT CIRC (2340) Master control program *09.11 SUPPLY FAULT WORD* bit 7 *09.01 FAULT WORD 1* bit 0 *09.11 SUPPLY FAULT WORD* bit 7 *09.15 SHORT CIRC FAULT*		●	Short circuit in the inverter unit (or one of parallel-connected inverter modules).	Measure resistances of inverter power semiconductors (IGBTs). If faulty IGBTs are found, replace IGBTs and/or INT and/or NGDR boards or inverter module. Check main circuit.
SC INV 1 U (23B0) SC INV 1 V (23B1) SC INV 1 W (23B2) SC INV 2 U (23B3) SC INV 2 V (23B4) SC INV 2 W (23B5) … SC INV 12 W (23D3) *09.15 SHORT CIRC FAULT*		●	The name of the message indicates the number of the inverter module and phase.	
SUPPLY PHASE (3130) *09.02 FAULT WORD 2* bit 0		●	Missing phase during synchronization.	Check main fuses. Check grid for imbalance.
SYNCHRO FLT (8180) Master control program *09.11 SUPPLY FAULT WORD* bit 13		●	Synchronization to network has failed. Network frequency has changed considerably since identification routine.	Perform network identification routine again. See parameter *99.07 LINE SIDE ID RUN*.
SYSTEM START (1087)	●		Control program has been started (control unit is powered).	If this message appears during normal operation, check the 24 V supply to the control unit. Check the wiring for breakages and short circuits.

Message	Alarm	Fault	Cause	What to do
TEMP DIFF (4380) *09.17 TEMP DIF FLT WORD* *09.18 TEMP DIF ALM WORD*	●	●	Excessive temperature difference between parallel-connected inverter modules. Excessive temperature can be caused, for example, by unequal current sharing between parallel-connected inverter modules.	Check cooling fan. Replace fan. Check air filters.
TEMP DIF 1 U (44B1) TEMP DIF 1 V (44B2) TEMP DIF 1 W (44B3) TEMP DIF 2 U (44B4) TEMP DIF 2 V (44B5) TEMP DIF 2 W (44B6) … TEMP DIF 12 W (44D4) *09.18 TEMP DIF ALM WORD*	●		Excessive temperature difference between parallel-connected inverter modules. The name of the message indicates the number of the inverter module and phase. Excessive temperature can be caused, for example, by unequal current sharing between parallel connected inverter modules.	
TEMP DIF 1 U (4381) TEMP DIF 1 V (4382) TEMP DIF 1 W (4383) TEMP DIF 2 U (4384) TEMP DIF 2 V (4385) TEMP DIF 2 W (4386) … TEMP DIF 12 W (43A4) *09.17 TEMP DIF FLT WORD*		●		
T MEAS CIRC (FF91) *09.04 ALARM WORD 1* bit 6	●		Error in external temperature measurement circuit. This can be caused by broken temperature sensor or cable.	Check connections of external temperature measurement circuit.
USER MACRO (FFA1)		●	No User Macro saved or file is defective.	Create User Macro again.

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8

Fieldbus control

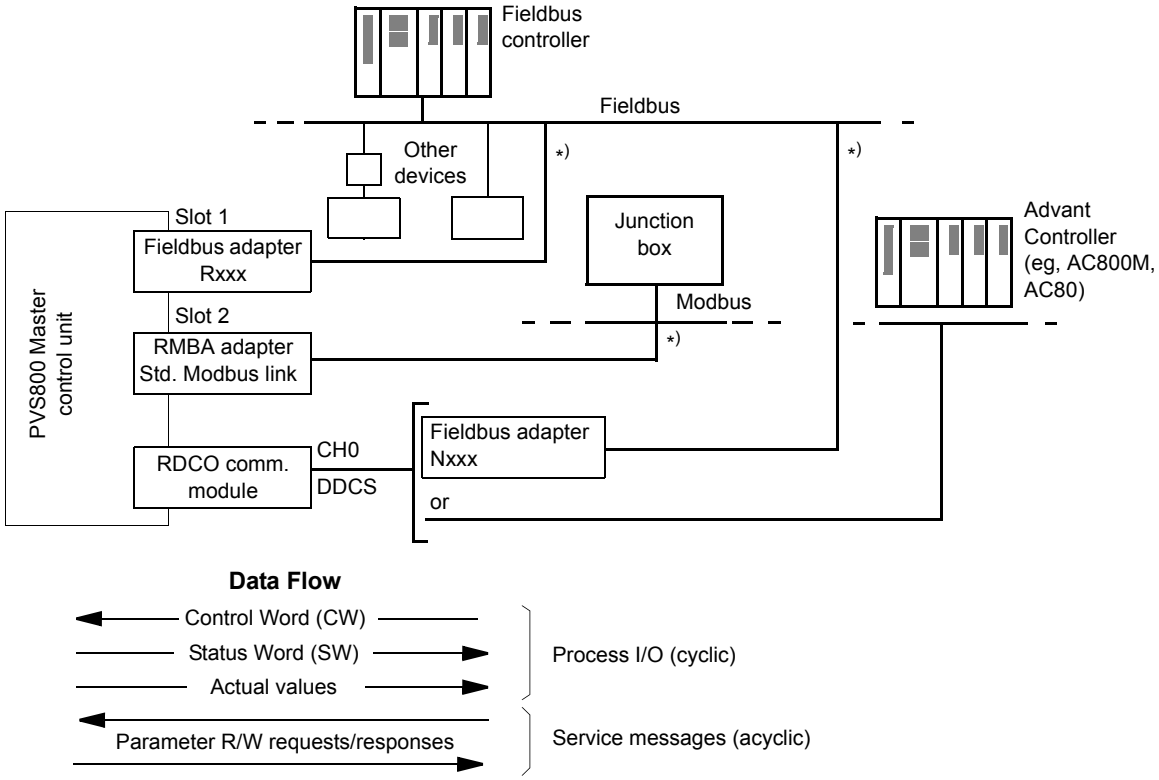
What this chapter contains

This chapter describes how the PVS800 can be controlled by external devices over a communication network.

System overview

The master control unit of the PVS800 can be connected to an external control system – usually a fieldbus controller – via an adapter module connected to Slot 1 on the RDCU control unit or via fieldbus adapter connected to channel CH0 of an RDCO (DDCS Communication Option) module.

The following diagram shows the control interfaces of the control unit.



*) Either one Rxxx **or** Nxxx, **and** one RMBA adapter can be connected to the PVS800 master control unit simultaneously.

Note: If the PVS800 is equipped for string monitoring, an RMBA module is installed into Slot 2 as standard.

The following table lists the DDCS channels provided by the RDCO-0x module.

Channel	Interfaces	RDCO-01	RDCO-02
CH0	Advant controller Fieldbus interface	10 MBd DDCS/DriveBus	5 MBd
CH1	Optional I/O	5 MBd	5 MBd
CH2	Inverter unit communication	10 MBd	10 MBd
CH3	DriveWindow (PC, 1 Mbit/s)	10 MBd	10 MBd

The PVS800 can be set to receive all of its control information through the fieldbus interface, or the control can be distributed between the fieldbus interface and other available sources, for example digital and analog inputs.

Commissioning and supporting tools

DriveWindow and other PC tools can be connected to DDCS channel CH3, either in a ring, or a star configuration using branching units. Before starting the communication, node addresses must be set for each connected unit. See parameter *70.15 CH3 NODE ADDR*. The new node address becomes valid on the next power-up of the control unit. DDCS channel CH3 is a slave on the communication link.

Setting up communication through fieldbus

Fieldbus adapters for several communication protocols are available (eg, PROFIBUS and Modbus). Rxxx type fieldbus adapter modules are mounted in expansion Slot 1 on the RDCU control unit. Nxxx type fieldbus adapter modules are connected to channel CH0 of the RDCO (mounted on the RDCU control unit).

Note: For instructions on setting up an RMBA-01 module, see section *Setting up communication through the standard Modbus link* on page *173*.

Before configuring the PVS800 for fieldbus control, the adapter module must be mechanically and electrically installed according to the instructions given in the hardware manual of the PVS800, and the module manual. The communication between the master control program and the adapter module is then activated by setting parameter *98.02 COMM. MODULE*.

The following table lists the parameters that need to be defined when setting up communication through a fieldbus adapter.

Parameter	Alternative settings	Setting for fieldbus control	Function/Information
COMMUNICATION INITIALIZATION			
98.02 COMM. MODULE	*NO* *FIELDBUS* *ADVANT/N-FB* *STD MODBUS*	*FIELDBUS* (with Rxxx or Nxxx) *ADVANT/N-FB* (with Nxxx)	Initialises communication between PVS800 and fieldbus adapter module. Activates module set-up parameters for type Nxxx and Rxxx fieldbus modules (group *51 MASTER ADAPTER*).
70.01 CH0 NODE ADDR	0…254	1	Node address for DDCS channel CH0
*71.01 CH0 DRIVEBUS MODE**	*NO* = DDCS mode *YES* = DriveBus mode	*NO*	Communication mode for DDCS channel CH0
70.04 CH0 TIMEOUT	0…60000 ms		Defines the delay time before channel CH0 (type Nxxx adapter) or type Rxxx fieldbus adapter interface communication break alarm/fault is indicated.
70.05 CH0 COM LOSS CTRL	*NO FAULT* *FAULT*	*FAULT*	Selects how the PVS800 reacts when a communication error on DDCS channel CH0 or on type Rxxx fieldbus adapter interface has been detected. Time delay for the communication break alarm/fault activation is defined by parameter *70.04 CH0 TIMEOUT*. **Note:** This parameter is in use when external serial communication is activated by parameter *98.02 COMM. MODULE*.
70.19 CH0 HW CONNECTION	*RING* *STAR*	Default value is *STAR* which is typically used with branching units (NDBU).	This parameter has no effect in the DriveBus mode.

Parameter	Alternative settings	Setting for fieldbus control	Function/Information
ADAPTER MODULE CONFIGURATION			
51.01 MODULE TYPE	-	-	Displays the type of the fieldbus adapter module.
51.02…51.99 (module-specific)	These parameters are adapter module-specific. For more information, see the module manual. **Note:** All of these parameters are not necessarily visible.		
RECEIVE AND TRANSMIT DATA DEFINITIONS			
Groups *90 D SET REC ADDR…93 D SET TR ADDR*			Addresses for receive and transmit data. See section *External control interface* on page *177*.

* Parameter takes effect after the next power-up of the PVS800.

Setting up communication through the standard Modbus link

An RMBA-01 Modbus Adapter installed in Slot 1 of the master control unit forms an interface called the standard Modbus link.

Note: If the PVS800 is equipped for string monitoring, this configuration is not available as an RMBA module is already installed in Slot 2. (Only one RMBA module is supported by the control unit.)

The standard Modbus link can be used for external control of the PVS800 by a Modbus controller (RTU protocol only).

Before configuring the master control program for Modbus control, the adapter module must be mechanically and electrically installed according to the instructions given in the hardware manual of the PVS800, and the module manual. The communication between the PVS800 and the adapter module is then activated by setting parameter *98.02 COMM. MODULE*.

The following table lists the parameters which need to be defined when setting up communication through the standard Modbus link.

Note: With an NMBA-01 Modbus Adapter, parameter *98.02 COMM. MODULE* must be set to FIELDBUS or ADVANT/N-FB. See parameter setting instructions in section *Setting up communication through fieldbus* on page *171*.

Parameter	Alternative settings	Setting for fieldbus control	Function/Information
98.02 COMM. MODULE	*NO*; *FIELDBUS*; *ADVANT/N-FB*; *STD MODBUS*	*STD MODBUS*	Initialises communication between PVS800 and Modbus adapter module. Activates communication parameters in group *52 STANDARD MODBUS*.
52.01 STATION NUMBER	1…247		Specifies the station number of the PVS800 master control unit on the standard Modbus link.
52.02 BAUDRATE	600; 1200; 2400; 4800; 9600; 19200		Defines the communication speed of the standard Modbus link.
52.03 PARITY	*NONE1STOPBIT*; *NONE2STOPBIT*; *ODD*; *EVEN*		Defines the parity setting for the standard Modbus link.

The master control program parameters, data words, references and actual values are mapped into the 4xxyy register area:

Signal	Address	Modbus address
Control Word (MCW)	*07.01 MAIN CTRL WORD*	40001
Reference 1	*23.01 EXT MPPT DC REF*	40002
Reference 2	*24.02 Q POWER REF*	40003
Main Status Word	*08.01 MAIN STATUS WORD*	40004
Actual 1	*01.10 AC POWER*	40005
Actual 2	*01.07 AC CURRENT L1*	40006

For the mapping of other signals and parameters see section *Modbus and Modbus Plus address* below.

Modbus link

The CDP 312R control panel or DriveWindow can be connected to the PVS800 through a Modbus link. The communication speed of the link is 9600 bit/s (8 data bits, 1 stop bit, odd parity). The connected device is the master on the communication link. NBCI-01 Bus Connection Modules must be used if the distance between the panel and the PVS800 is over three metres.

Modbus is designed for integration with Modicon PLCs (PLC = Programmable Logic Controller) or other automation devices, and its services correspond mainly to the PLC architecture. The PVS800 looks like a Modicon PLC from the network.

Modbus and Modbus Plus address

The PVS800 master control program parameters, data words, references and actual values are mapped into the 4xxyy register area. This holding register can be read from an external device, which can modify the register values by writing into them.

There are no setup parameters for mapping the data into the 4xxyy register area. The mapping is pre-defined and corresponds directly to the master control program parameter grouping which is being used by the local control panel.

The parameters and signals of the master control program are mapped into the area 4xxxx as follows:

- 40001…40096 are reserved for data sets:
  40001 = data set 1 data word 1
  40002 = data set 1 data word 2
  40003 = data set 1 data word 3
  40004 = data set 2 data word 1 etc.
- 40101…40999 are reserved for actual signals 01.01…09.99.
- 41000…49999 are reserved for PVS800 parameters 10.01…99.99 (for example, 41302 is parameter 13.02). In this mapping, the thousands and hundreds correspond to the group number, while the tens and ones correspond to the parameter number within a group.

Setting up communication through Advant controller

The Advant controller is connected via DDCS link to channel CH0 of the RDCO. The communication between the PVS800 and the controller is activated by setting parameter *98.02 COMM. MODULE*.

- **AC 800M Advant Controller**

DriveBus connection: CI858 DriveBus Communication Interface required. See *CI858 DriveBus Communication Interface User's Manual,* [3AFE68237432 (English)].

For more information, see *AC 800M Controller Hardware Manua*l [3BSE 027 941 (English)], *AC 800M/C Communication, Protocols and Design Manual* [3BSE 028 811 (English)] ABB Industrial Systems, Västerås, Sweden.

- **AC 80 Advant Controller**

DriveBus connection: Connectable to RMIO-01/02 board with RDCO-01

Optical ModuleBus connection: TB811 (5 MBd) or TB810 (10 MBd) Optical ModuleBus Port Interface required. See section *Optical ModuleBus connection* below.

- **CI810A Fieldbus Communication Interface (FCI)**

Optical ModuleBus connection

TB811 (5 MBd) or TB810 (10 MBd) Optical ModuleBus Port Interface required.

The TB811 Optical ModuleBus Port Interface is equipped with 5 MBd optical components, while the TB810 with 10 MBd components. All optical components on a fibre optic link must be of the same type since 5 MBd components do not match with 10 MBd components. The choice between TB810 and TB811 depends on the equipment it is connected to. With RDCO Communication Option Module, the Interface is selected as follows:

Optional ModuleBus port interface	DDCS Communication Option Module		
	RDCO-01	RDCO-02	RDCO-03
TB811		×	×
TB810	×		

If branching unit NDBU-85/95 is used with CI810A, TB810 Optical ModuleBus Port Interface must be used.

The following table lists the parameters that need to be defined when setting up communication between the PVS800 and an Advant controller.

Parameter	Alternative settings	Setting for fieldbus control	Function/Information
98.02 COMM. MODULE	*NO*; *FIELDBUS*; *ADVANT/N-FB*; *STD MODBUS*	*ADVANT/N-FB*	Initialises communication between RDCO module (fibre optic channel CH0) and Advant controller. The transmission speed is 4 Mbit/s.
70.01 CH0 NODE ADDR	0…254	AC 800M DriveBus (CI858) 1…24 AC 800M ModuleBus 1…125 AC 80 DriveBus 1…12 AC 80 ModuleBus 17…125 FCI (CI810A) 17…125 APC2 1	Defines the node address for DDCS channel CH0.
*71.01 CH0 DRIVEBUS MODE**	*NO* = DDCS mode *YES* = DriveBus mode	AC 800M DriveBus (CI858) *YES* AC 800M ModuleBus *NO* AC80 DriveBus *YES* APC2/AC80 ModuleBus/FCI (CI810A) *NO*	Defines the communication mode for DDCS channel CH0.
70.04 CH0 TIMEOUT	0…60000 ms		Defines the delay time before channel CH0 (type Nxxx adapter) or type Rxxx fieldbus adapter interface communication break fault is indicated.
70.05 CH0 COM LOSS CTRL	*NO FAULT FAULT*		Defines the action taken after a communication fault on DDCS channel CH0.
70.19 CH0 HW CONNECTION	*RING STAR*	Default value is *STAR* which is typically used with branching units (NDBU). This parameter has no effect in the DriveBus mode.	
Groups *90 D SET REC ADDR…93 D SET TR ADDR*			Defines the addresses for receive and transmit data. See section *External control interface* on page *177*.

*Parameter takes effect after the next power-up of the PVS800.

External control interface

The communication between an external system and the PVS800 consists of data sets. The link sends the data set into the data set table in the PVS800 master control program and returns the content of the next data set to the external control system as a return message.

If DriveBus protocol is used, the DriveBus master can send one message which contains 1 data set for 10 PVS800 master control units during a 1 ms time period.

The PVS800 master control program supports the use of data sets 1, 2 or data sets 10…25. One data set (DS) consists of three 16-bit words called data words (DW).

The data received from an external control system affects only the RAM (not the FPROM) memory of the RMIO board.

Data sets 1 and 2

Data set 1 for controlling the PVS800 is referred to as the Main Reference data set. Data set 2 containing actual information is referred to as the Main Actual Signal data set. Fieldbus communication uses mainly data sets 1 and 2 (ie, when parameter *98.02 COMM. MODULE* is set to *FIELDBUS*).

The contents of the Main Reference and Main Actual Signal data sets are fixed as follows:

For type Nxxx fieldbus adapters and RMBA-01

DS	DW	Signal	Address	Update time
1	1	Control Word	*07.01 MAIN CTRL WORD*	10 ms
	2	Reference 1	*23.01 EXT MPPT DC REF*	10 ms
	3	Reference 2	*24.02 Q POWER REF*	10 ms
2	1	Status Word	*08.01 MAIN STATUS WORD*	10 ms
	2	Actual 1	*01.10 AC POWER*	10 ms
	3	Actual 2	*01.07 AC CURRENT L1*	10 ms

When parameter *98.02 COMM. MODULE* is set to *FIELDBUS* and Anybus modules (eg, RPBA-0x, RDNA-0x…) are used, the contents of data sets 1 and 2 are as follows:

DS	DW	Signal	Address	Update time
1	1	Control Word	*07.01 MAIN CTRL WORD*	10 ms
	2	Reference 1	*23.01 EXT MPPT DC REF*	10 ms
	3	Reference 2	*24.02 Q POWER REF*	10 ms
2	1	Main Status Word	*08.01 MAIN STATUS WORD*	10 ms
	2	Actual 1	*01.10 AC POWER*	10 ms
	3	Actual 2	*01.07 AC CURRENT L1*	10 ms

Data sets 10…25

The contents of data sets 10…25 can be selected by parameter groups *90 D SET REC ADDR*…*93 D SET TR ADDR*.

Received data sets

DS	DW	Time*	Default address	Selector
10	1	2 ms	*07.01 MAIN CTRL WORD*	90.01
	2	2 ms	*23.01 EXT MPPT DC REF*	90.02
	3	2 ms	*24.02 Q POWER REF*	90.03
12	1	4 ms	*31.16 POWER LIMITING*	90.04
	2	4 ms		90.05
	3	4 ms		90.06
14	1…3	10 ms		90.07…90.09
16	1…3	10 ms		90.10…90.12
18	1…3	100 ms		90.13…90.15
20	1…3	100 ms		90.16…90.18
22	1…3	100 ms		91.01…91.03
24	1…3	100 ms		91.04…91.06

Transmitted data sets

DS	DW	Time*	Default address	Selector
11	1	2 ms	*08.01 MAIN STATUS WORD*	92.01
	2	2 ms	*01.10 AC POWER*	92.02
	3	2 ms	*01.07 AC CURRENT L1*	92.03
13	1	4 ms		92.04
	2	4 ms		92.05
	3	4 ms		92.06
15	1	10 ms		92.07
	2	10 ms		92.08
	3	10 ms		92.09
17	1	10 ms		92.10
	2	10 ms		92.11
	3	10 ms		92.12
19	1…3	100 ms		92.13…92.15
21	1…3	100 ms		92.16…92.18
23	1…3	100 ms		93.01…93.03
25	1…3	100 ms		93.04…93.06

* Time within which the master control program reads data from the data sets to the parameter table or writes data from the parameter table to the data sets. Since the PVS800 is a follower of the communication master, the actual communication cycle time depends on the communication speed of the master.

Further information

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